



KENTUCKY TRANSPORTATION CENTER

**CONTEXT SENSITIVE SOLUTIONS FOR
CONSTRUCTION AND MAINTENANCE**



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College of Engineering



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We create and participate in partnerships
to promote safe and effective
transportation systems.

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Listening and communicating along with
courtesy and respect for others.

Honesty and Ethical Behavior

Delivering the highest quality
products and services.

Continuous Improvement

In all that we do.

Research Report KTC-07-20/RSF-15-05-1F

**CONTEXT SENSITIVE SOLUTIONS FOR
CONSTRUCTION AND MAINTENANCE**

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16. Abstract The objective of this research was to conduct a survey to assess the state of practice related to state highway agencies (SHAs) implementing context sensitive solutions including its application in Construction and Maintenance and to prepare a workshop enabling SHA officials to adopt practices promoting context sensitivity beyond Planning and Design. Deliverables from the study efforts include a survey summary of context sensitive solutions and workshop materials/presentation suitable for use in training a wide range of SHA personnel working in Construction and Maintenance.			
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EXECUTIVE SUMMARY

Context Sensitive Solutions (CSS) is a term applied to the application of Context Sensitive principles in all phases of project development and beyond. Currently, little emphasis has been placed upon SHA actions to apply CSS in the latter stages of project development. Under this study, a nationwide survey of SHA implementation of CSS was conducted including questions related to SHA application of CSS in construction and after facility completion. A literature review was also performed relative to the application of CSS in Construction and Maintenance. Very little information was obtained from SHAs or from existing literature.

By developing and implementing training on applying CSS in Construction and Maintenance, the relevant practices and principles can be provided to SHA personnel in Construction and Maintenance who are relatively unfamiliar with CSS principles. That training can be applied on CSS (and non-CSS) projects including those involving new construction, reconstruction and maintenance of facilities. This training will enable SHAs to better implement CSS principles and extend its benefits.

Deliverables from the study efforts include the SHA survey on CSS implementation (provided in summary form) and workshop materials/presentation suitable for use in training a wide range of Construction and Maintenance personnel about CSS and its application both in Construction and Maintenance.

1.0 INTRODUCTION AND BACKGROUND

Study Objectives/Tasks

This work was funded by the Federal Highway Administration under Federal Study 15 *CONTEXT SENSITIVE SOLUTIONS: CSS Training Courses and CSS Construction/Maintenance State of Practice* in October 2005. This study was intended to: 1) continue funding of Kentucky Transportation Center (KTC) context sensitive solutions (CSS) training, 2) provide a review of related state highway agency (SHA) practices impacting construction and maintenance and 3) prepare a PowerPoint (PPT) presentation on the state of practice for CSS.

KTC researchers conducted a national survey of SHAs in 2006 concerning a range of CSS issues/activities including those related to Construction and Maintenance. The survey responses addressed some CSS principles were applied beyond Planning and Design. Few relevant materials/details were provided by the SHAs and other published information on CSS practices for Construction and Maintenance available from literature searches was limited.

KTC researchers possessed previous experience with CSS applications to both construction and maintenance. They had developed a construction-related course for the Kentucky Transportation Cabinet (KYTC) in 2002 (aimed a KYTC field crews and contractors) and had worked with KYTC Maintenance personnel to develop projects applying many CSS principles. Based upon their past work with the KYTC, they were aware of many unreported SHA actions applying CSS in both Construction and Maintenance. KTC researchers determined that it would be more beneficial to address the application of CSS in Construction and Maintenance as a training course for SHA personnel/officials rather than a state of practice presentation. They termed those applications Context Sensitive Construction (CSC) and Context Sensitive Maintenance (CSM).

KTC researchers developed CSS training courses for both CSC and CSM. They were directed at a range of SHA personnel involved with Construction and/or Maintenance. In addition to the CSS topics, the presentations included material on “sustainability” issues that could be amplified or eliminated by an SHA. The courses consisted of PPT presentations supplemented with background information for each slide in speaker notes form to provide “train the trainer” supplements.

The draft PPT training modules developed for both topics originally included separate introductory modules. An executive presentation module was considered, but not developed. The CSC/CSM workshop was to include a two-hour session addressing CSC (including both the introductory and course module). It was intended primarily for Construction personnel. It was to be followed by a two-hour workshop on CSM (including both the introductory and course module) intended primarily for Maintenance personnel. Following past KTC practice, the lecture materials were supplemented with participatory “case studies” to actively engage the audience and maintain their attention and interest in the workshop materials.

The pilot course was delivered to KYTC officials, primarily members of the Study Advisory Committee, in December 2006. Their input led to modifications in the course format

and module content with the elimination of the introductory module for the CSM portion of the course. The new intent was for both Construction and Maintenance personnel to attend the CSC portion of the course (including the introductory module) and for Maintenance personnel to attend the CSM portion of the course. A decision was made to defer preparation of the executive presentation module and provide the course introductory module in its stead if an SHA requested an executive presentation.

Origins of CSC and CSM

In the early 2000s, CSD began to be commonly replaced with a more inclusive term-Context Sensitive Solutions (CSS). The parties that had coined “Context Sensitive Design” were primarily focused on the early phases of project development (i.e. planning and design). Subsequently it was recognized that other vital context sensitive activities occurred within the PD process and that those needed to be recognized. “Context Sensitive Solutions” was applied to address that perceived limitation.

The current FHWA definition of CSS is:

Context Sensitive Solutions – is a collaborative, interdisciplinary approach that involves all stakeholders to **develop a transportation facility** that fits its physical setting preserves scenic, aesthetic, historic and environmental resources while maintaining safety and mobility. CSS considers the total context within which a transportation improvement project will exist.

Under CSS, the focus of applying context-sensitivity was extended into the construction phase of the project development (PD) process. The extension of CSS principles in this phase is termed Context Sensitive Construction (CSC). A definition of CSC is:

Context Sensitive Construction – is the continuation and advancement of the objectives of safety, mobility, enhancement of the natural environment, and preservation of community values into the construction phase of a project.

The major objectives of CSC are:

- Preserving the human and natural environment
- Engaging stakeholders/public on construction projects/activities
- Minimal disturbance to motorists, the public and businesses
- Improving construction practices to promote sustainability and efficiency

SHAs need to preserve the human and natural environments while preserving the transportation infrastructure. They should reach out to stakeholders/public at every opportunity. They want to be as unobtrusive as possible while carrying out our assigned duties. They want to be “future friendly” and strive to get better at what they are doing by implementing a continuous improvement effort focused on Construction activities related to CSS projects. In many cases, projects that are considered “maintenance” work are functionally assigned to SHA Construction Divisions for oversight during field work. In those cases, a full PD process may not have been employed. In those instances, CSS principles can be applied in the construction phase of the project enabling the wider application of CSS principles by SHAs.

Beyond Construction, there are opportunities to apply CSS principles on Maintenance projects. This can be done by: 1) perpetuating agency CSS promises related to a completed facility and 2) developing maintenance projects using CSS principles. Figure 1 portrays the life cycle of a highway project/facility. Many projects take about 10 years to program and construct and serve an additional 30-50 years without major reconstruction. SHA promises related to the initial project development may require attention over the life of a facility. Additionally, Maintenance may develop significant projects that are not considered reconstruction and not subject to an agency’s full PD process. Major maintenance contracts may involve internal project development and require addressing some CSS principles to properly execute the contract. In those situations, Context Sensitive Maintenance (CSM) is applied. CSM may also be applied as principle-driven practices at all SHA facilities. A definition of Context Sensitive Maintenance is: *Context Sensitive Maintenance* – is the continuation of safety and mobility, the environment, and community values into the maintenance and operations of a facility.

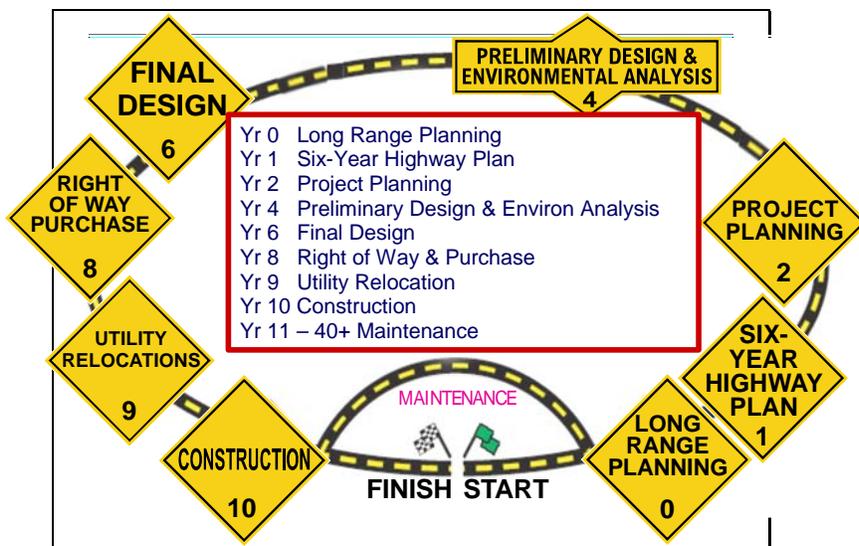


Figure 1. The life cycle of an SHA project/facility.

The major objectives of CSM are:

- Preserving the human and natural environment
- Engaging stakeholders/public on maintenance projects/activities
- Minimal disturbance to motorists, the public and businesses
- Improving maintenance practices to promote sustainability and efficiency.

The objectives of CSM parallel those of CSC. SHAs seek to preserve the natural and human environments while preserving the transportation infrastructure. They should reach out to stakeholders/public at every opportunity. They want to be as unobtrusive as possible while carrying out our assigned duties. They want to be “future friendly” and strive to get better at what they are doing by implementing a continuous improvement effort.

CSM differs from CSC in several ways. CSC applies to CSS projects-CSM can apply to all maintenance activities. CSC applies to both projects developed using the full CSS PD process and those developed by Maintenance. CSC is localized. It is limited to projects. CSM can apply

to all maintenance activities at any location where an SHA facility exists (though a detailed discussion is not provided). Below is a list of the CSS principles.

1. Involve all stakeholders
2. Seek broad-based public involvement
3. Use full range of communication methods
4. Achieve consensus on purpose and need
5. Utilize full range of design choices
6. Consider all alternatives and modes
7. Maintain environmental harmony
8. Consider community and social issues
9. Provide aesthetic treatments & enhancements
10. Provide a safe facility for users & community
11. Document project decisions
12. Track and meet all project commitments
13. Create a lasting value for the community
14. Use interdisciplinary teams
15. Use all resources effectively (time and budget)

CSC and CSM apply to all CSS principles listed in normal font. This shows that they have the potential to address/further SHA emphasis on CSS both during and subsequent to project delivery. Figure 2 presents a version of the CSS PD process adopted by the Kentucky Transportation Cabinet in 2000 that includes both Construction and Maintenance & Operations.

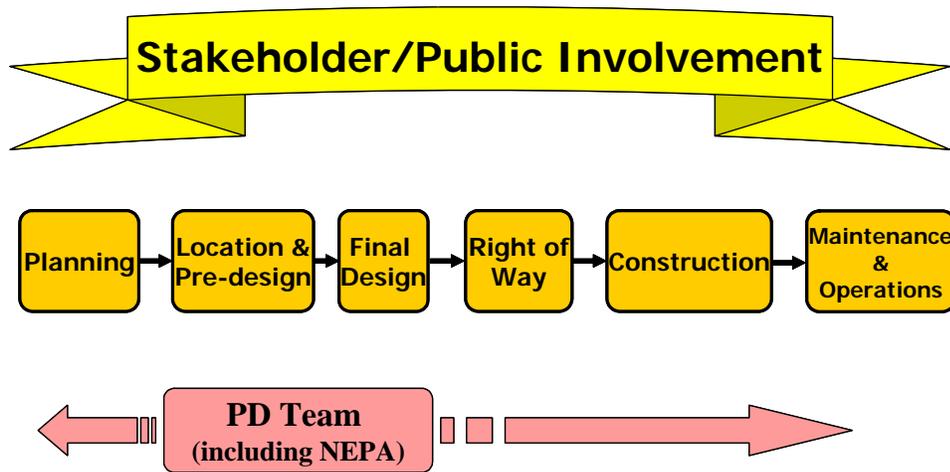


Figure 2. The Kentucky Transportation Cabinet project development process integrating Construction and Maintenance & Operations (2000).

2.0 SUMMARY OF RESULTS

Deliverables from the study efforts include the survey/summary along with workshop materials and training guides suitable for delivering presentations to a wide range of SHA personnel ranging from upper management to field project inspectors/ maintenance garage workers (with minimal customization). The former information is presented in Section 3.0 titled “Context Sensitive Solutions Survey of State Highway Agencies”.

PPT slides/speaker notes for the workshop presentation materials titled “Context Sensitive Construction and Context Sensitive Maintenance Training Course” are presented in Section 4.0.

3.0 Context Sensitive Solutions Survey of State Highway Agencies

Kentucky Transportation Center Context-Sensitive Solutions State-of-Practice Survey of State Highway Agencies

Background

This survey was conducted in 2006 by the Kentucky Transportation Center (KTC) at the University of Kentucky as a requirement for a Federal Highway Administration study addressing Context-Sensitive Solutions (CSS) issues with an emphasis on CSS in construction. The survey was intended to determine the extent of implementation of CSS by states and examine specific CSS practices they employed.

A survey questionnaire was prepared in March 2006 by KTC researchers. It consisted of 50 yes/no and open-ended questions. While this appeared to require significant effort from SHAs for response, most of the questions were of the yes/no type and did not require extensive SHA input. The survey could be completed within two hours by a person knowledgeable in all aspects of a SHA activities related to CSS. If various parties within different SHA departments needed to provide input, the survey would take longer to complete and require some effort for identification of responders and transmittal of the survey.

The survey was to be submitted to all 50 states and the District of Columbia. Key contacts were sought in the various SHAs to receive the survey, complete it, or, if necessary, oversee its completion. Past KTC training provided to some 20 SHAs enabled KTC researchers to identify some appropriate SHA contacts. Other contacts were established through telephone enquiries to the remaining SHAs. The survey was distributed to the SHA contacts by e-mailings in February 2006.

Response to the survey was slow, perhaps because KTC researchers had not mandated a due date. In July 2006, after receiving few completed surveys, KTC researchers attempted to contact SHA officials receiving the survey for responses. In several cases, new SHA contacts were required. In others, the survey was being passed to various departments within SHAs to obtain the proper responses. Some SHA officials could not be contacted or did not respond to repeated KTC inquiries. Several SHA officials stated they were currently too busy to complete the survey, but would try to provide it in the “near future”. KTC researchers delayed completing the survey in the hopes that a greater number of responses would be obtained. By November 2006, KTC had received 35 completed SHA surveys-a 69 percent response rate (Table 1). The decision was made to close the survey and compile the available responses. Those are presented below.

This is a general (non-attributable) summary of state responses to the KTC questionnaire. For some questions, fewer than 35 responses are indicated as some SHA officials did not respond to every question. For questions where multiple-choice answers were provided, there may be more than 35 total responses as some SHAs selected multiple responses. After Question 5, there were no further questions for SHAs that had not yet adopted CSS. Those SHAs were asked to submit their responses for only the first five questions.

Survey Summary

CSS History/Experience

Most (29) of the 35 responding agencies indicated that they were moving towards or had formally adopted CSS. About two-thirds of the agencies responding indicated that they had adopted CSS within the past 5 years.

Policies/Procedures

Several agencies that had not yet adopted CSS stated that they already had effective public involvement or were employing flexible design. About three-quarters of the agencies that had adopted CSS did so as a consequence of internal decision-making while the remaining quarter had done so due to executive or legislative mandates. The agencies were split as to whether they had effective policies in place to employ CSS.

Most agencies investigated multi-modal options prior to project development and more than half responding said that their agency made travel mode decisions prior to project development. Over half of those developed projects employing other transportation modes in place of roads or to limit road size increases.

About 40 percent of the agencies had a sustainability policy derived by executive or legislative mandates. Most of those had developed a policy addressing sustainability. Some agencies employed sustainability actions on CSS projects.

Most agencies take public/stakeholder involvement/input into account in preparing purpose and need statements. Most use the purpose and need statements to guide project solutions and evaluate options.

Nearly all responding agencies require a public involvement plan for CSS projects to insure effective public participation.

About three-quarters of all agencies have working relationships with local governments and planning organizations (e.g. MPOs) that impact CSS implementation. More agencies cited relationships with resource agencies and stakeholder groups as impacting their CSS implementation.

Over half of the responding agencies said that the adoption of CSS had resulted in changes in their project development processes.

Most agencies had encountered difficulties related to internal revisions to agency project commitments made by other departments. Responses indicated that part of the problem might be attributed to some agencies' lack of a mechanism to track those commitments. However, most agencies involved their construction and maintenance divisions with project commitments in some manner.

Most of the agencies were using CSS in conjunction with other practices to expedite overall project delivery. Many of those actions were supported by agency policies.

Most agencies stated that they did not cap project costs or work to specific cost figures based upon unit costs (e.g. \$/lane mile). Over half of the responding agencies stated that they did not cap the cost of enhancements. Most agencies stated that they managed public expectations related to projects (a possible cost-containment measure).

Most responding agencies used visual aids to inform the public about projects/features (e.g. visualization, renderings, etc.). All of them found visual aids to be effective in promoting public understanding of projects.

Most the responding agencies worked in multi-disciplinary teams. More than half of them applied CSS to all projects.

About half of the responding agencies have a program or set of practices to support CSS in construction.

Most of the agencies track both environmental and project commitments. Most inform contractors of those in the letting process with the majority doing so in pre-bid meetings.

To inform contractors of commitments they use plans, special notes, specifications, permits, pre-construction conferences and field oversight. Only a few agencies have CSS qualification requirements for contractors.

Over three-fourths of the agencies involved their maintenance/operations officials in project decision-making. They varied on when and how this was done during project development.

Most agencies seek to involve local governments with maintenance of CSS features along roads. About half of the agencies perform special/more attentive maintenance of CSS features they employ on projects.

Only a few agencies have established CSS performance measures. About one-third of the agencies perform post-project audits of CSS commitments. Of those doing so, all of them conducted audits on a project-specific basis with over half of those evaluating the results statewide.

More than half of the responding agencies used continuous improvement to enhance their CSS processes/practices.

Manuals/Training/Technology Exchange

Less than half of the agencies had comprehensive CSS manuals. The responding agencies were split on their potential benefits. Over half of the agencies provided CSS training for agency personnel, stakeholders, consultants and contractors. About the same number of agencies provided training for contractors/agency personnel related to compliance with environmental/project commitments.

Over half of the agencies share CSS information/experiences with sister agencies. Typically, those exchanges take place through AASHTO.

About one-third of the agencies worked with universities to promote CSS training to engineering students.

Problems/Concerns

Most of the agencies provided concerns/problems they were addressing related to CSS. Those included: stakeholder demands, concerns over cooperation with stakeholders, and a lack of effective CSS training for agency personnel.

Over half of the responding agencies had liability concerns in employing CSS. Most indicated that their personnel understood potential liability issues. Only one agency indicated that it had experienced legal issues for using CSS principles or flexible design.

Benefits

Most of the responding agencies stated that they had benefited from employing CSS while few saw no benefits. The benefits included early problem resolution, better relationships with stakeholders/public, reduced project development time and the ability to complete projects. Over half of the responding agencies indicated that using CSS had not increased project costs. Those indicating cost increases cited public involvement as the source of increased costs.

The questions and agency responses are presented in the Appendix in edited form.

Appendix: Response Summary by Questions

CSS Status

1. Characterize your agencies position regarding the implementation of Context-Sensitive Solutions on a 1-10 scale with 1 indicating not interested/involved, with 6 indicating you're your agency is planning to adopt CSS in the future, and 10 indicating your agency has used CSS for at least one year with policies and training for employees firmly in place. **33 SHAs Responding**

<i>Rating</i>	<i>No. of SHAs Responding</i>
<i>3</i>	<i>1</i>
<i>6</i>	<i>1</i>
<i>7</i>	<i>6</i>
<i>8</i>	<i>9</i>
<i>9</i>	<i>7</i>
<i>10</i>	<i>7</i>

2. How many years has your agency fully implemented CSS? **29 SHAs Responding**

- *1 Yrs – 5 agencies*
- *2 Yrs – 4 agencies*
- *3 Yrs – 5 agencies*
- *4 Yrs – 1 agency*
- *5 Yrs – 7 agencies*
- *7 Yrs – 2 agencies*
- *10 Yrs – 1 agency*
- *14 Yrs – 1 agency*
- *20 Yrs – 1 agency*
- *24 Yrs - 1 agency*
- *For Many Yrs – 1 agency*

Policies/Procedures

3. If your agency is planning to adopt CSS, do you have any CSS-related activities currently in place (e.g. public involvement, flexible design, etc.)? **8 SHAs Responding**

Responses *Yes – 7 No – 1*

Activities Currently in Place: Public Involvement (2)
Flexible Design (1)

4. If your agency has implemented CSS or plans to implement it, is that in response to an executive order or legislative mandate? **29 SHAs Responding**

Responses *Yes – 7 No – 22*

5. If your agency has implemented CSS, are the necessary policies and procedures in place or are additional ones needed?

Responses *Yes (Current ones are sufficient) – 12* *No (Additional ones are needed) - 14*

If yes, what further policies/procedures are needed, what issues would they impact?

- *We will know better once we get further into it.*
- *Some are in place, but more direction and guidance are needed.*
- *Procedures for implementations/guidance on appropriateness & feasibility.*
- *Policies are constantly reviewed to meet changing laws, updated practices, and cost considerations. This includes refining/updating ADA requirements, to meet revised national policies and reviewing cost participation on certain items of work (i.e. pedestrian lighting).*
- *Upper management "buy - in" and advocacy statewide is a question or concern that can affect lower level parishioners we could use more top on down directives.*
- *Need the final supporting Policy Statement which gives teeth to the CSS effort and allows for further integration of CSS philosophy. We have a CSS guidance document, but no formal policy statement.*
- *At _DOT, we have added sustainability to CSS to create CS3: "Context Sensitive and Sustainable Solutions".*
- *_DOT's Guide to Context Sensitive Solutions" is under development.*
- *Policies may be needed if CSS was not being addressed adequately.*
- *_DOT may typically begin with a standard design, but as public involvement begins and concerns are heard, decisions are made based on B/C to the landowners and traveling public.*
- *Any CSS commitments are documented in the scope or design process.*
- *Multidisciplinary teams.*
- *Current _DOT strategic direction is sufficient for _DOT to implement the CSS philosophy on most projects. High level (Legislators and Transportation Commissioners) political acceptance thru mandate may be necessary to get 100% completely in support of _DOT's CSS philosophy.*

6. Does your agency choose among travel modes prior to project development?

Responses *Yes – 16 No – 10*

7. Does your agency investigate multimodal options prior to project development?

Responses *Yes – 24 No – 4*

If no, when are such decisions made? **10 SHAs Responding**

- *Usually early in the design process after project development has started.*

- *During development.*
- *Bike/Pedestrian needs are considered in agency design phase. Transit is generally considered at Planning (MPO/RPO) phase.*
- *We have just restructured our early planning process to make this a more common practice.*

8. Has your agency developed projects where other modes were employed in place of roadways or to limit their size?

Responses *Yes – 10 No – 16*

9. Does your state government have a general policy on sustainability resulting from an executive order or state mandate?

Responses *Yes – 11 No – 15*

10. Does your agency have a policy addressing sustainability?

Responses *Yes – 10 No – 16*

If yes, what is that policy and how is it applied to project development? **7 SHAs Responding**

- *Our agency has many sustainability policies, here's a quote from one: "The Department advocates community design (e.g., urban infill, mixed use, transit oriented development) that promotes an efficient transportation system and healthy communities."*
- *Project Development & Environmental Guidelines and Plan Preparation Manual.*
- *CSS must be used on all projects whenever feasible if given by executive order from the Governor.*
- *Sustainable resources.*
- *New policy language addressing sustainable is included in the agency's Transportation Plan (high-level multi-modal policy and planning document). This has not yet filtered down into modal plans and transportation system plans, so is not yet directly applied to project development. __DOT is currently developing a holistic and integrated sustainability program for the department, and in the coming years the department will more formally and comprehensibly integrate sustainability into project development decisions.*
- *Included in the introduction of agency's guide.*
- *__DOT's Design Policy Memo addresses sustainability of a 20- year life cycle for highway projects.*

If yes, are sustainability decisions incorporated with those involving CSS? **8 SHAs Responding**

- *It is the Department's goal to implement CSS on every project, so yes, so when sustainability decisions are an issue they are part of the CSS process.*

- *Yes (2)*
- *Not at the moment but that is an initiative with the guidance documents we have under development and which should be available by the end of May this year.*
- *Rarely, it really only applies to more traditional sustainability practices (recycling, energy, etc.).*
- *Yes, __DOT's CS3 (Context Sensitive and Sustainable Solutions) approach to the OTIA III State Bridge Repair Program integrates sustainability and context-sensitive solutions. This approach will be transferred from the bridge program and folded into the regular STIP cycle in the coming years.*
- *CSS is also a Design Policy Memo.*
- *Even though we do not have a policy, sustainability concerns are usually addressed in our project development process.*

11. Does your agency prepare a purpose and need statement that takes into account public and stakeholder involvement/

Responses Yes – 23 No – 3

12. Does your agency use the purpose and need statement to actually guide project solutions and compare options?

Responses Yes – 23 No – 4

13. Does your agency require a public involvement plan for CSS projects to ensure effective stakeholder participation?

Responses Yes – 23 No – 2

14a. Do your agency's working relationships with local governments and MPOs related to project programming have an impact on CSS implementation?

Responses Yes – 21 No – 6

b. Do your agency's working relationships with resource agencies/stakeholder groups impact the implementation of CSS?

Responses Yes – 24 No – 3

15. Have there been any changes in your agency in the project development process to accommodate CSS? (Include creating new positions/hiring new personnel)

Responses Yes – 16 No – 11

16a. Has your agency encountered internal difficulties related to project revisions between planning and design or design and construction that impact CSS-related commitments?"

Responses *Yes – 18 No – 9*

b. Does your agency have formal procedures to track CSS-related commitments made in planning and design through the construction phase?

Responses *Yes – 9 No – 16*

17. Does your agency involve the construction division with CSS-related commitments?

Responses *Yes – 23 No – 3*

18. Does your agency involve the maintenance division with CSS-related commitments?

Responses *Yes – 20 No – 6*

19. Is your agency using CSS in conjunction with other practices (e.g. environmental streamlining) in a proactive manner to expedite project delivery?

Responses *Yes – 19 No – 6*

If yes, what environmental initiatives is your agency employing? **16 SHAs Responding**

- *Context sensitive solutions are part of the environmental process. Environmental streamlining processes have been (and continue to be) developed in conjunction with the FHWA to expedite project delivery.*
- *Agency has an on-line resource to help state and local agency staff plan, prepare, submit, and evaluate environmental documents for transportation projects and following them expedites the review and approval processes and concurrence by reviewing agencies.*
- *MATE Process- Mid Atlantic Transportation Environmental Streamlining Process*
- *Efficient Transportation Decision Making Process (EDTM)*
- *SHA has a streamlining process agreement which allows SHA to perform certain planning and preliminary engineering functions provided the proposed actions are one of a list of pre-approved activities.*
- *Early permitting processes. Partnering with the environmental agencies*
- *CSS is an environmental and project development streamlining tool.*
- *Literally hundreds. We have database of initiatives that are employed throughout the Department. Most notably, we have an Environmental Stewardship Policy and an Environmental initiative Inventory database, Division Environmental Officers, New Office of Environmental Quality, etc.*
- *Environmental programmatic permitting; mitigation banking.*
- *Linking Planning and NEPA, Project Delivery Streamlining, Restructure agency coordination meeting process.*

- *Scope and public involvement would be done typically along with the NEPA process which may or may not include CSS with a project.*
- *Restructured early project development process and interagency agreements and more involvement with locals through MPOs and RPOs early in process.*
- *Environmental stewardship, Environmental streamlining, and beginning linking NEPA to planning.*
- *Integrated natural resources and other community concerns.*
- *Environmental Management Systems, Green Highways Initiative.*
- *Programmatic agreement with outside agencies. Also the use of agency liaisons.*

If yes, what policies/actions are in place to support those? **12 SHAs Responding**

- *Environmental processes established and implemented through both Preconstruction Manual guidance and Environmental Manual guidance.*
- *_____ has many policies related to the environment. One is our Environmental Policy, which states, among other things: "The Department evaluates the environmental benefits and consequences of its activities and implements practices that minimize environmental impacts."*
- *Efficient Transportation Decision Making Process (EDTM)*
- *Our highway project develop process guidance (hpdp)*
- *Environmental Design Directive*
- *Environmental Stewardship Policy. Development of an Environmental Management Plan (strategic plan for the environment)*
- *Policies/guidelines in the OTIA III Bridge Program*
- *Community Impact Assessment policy, Project Delivery Process Handbooks*
- *We follow the NEPA process.*
- *Public involvement process policy.*
- *By executive order*
- *A policy entitled "Context Sensitive Design"*

20. Does your agency limit/cap project costs?

Responses *Yes – 12 No – 16*

21. Do you have a cost figure that your agency works to (in terms of \$ per lane mile, etc.)

Responses *Yes – 4 No – 25*

If yes, give an example. **6 SHAs Responding**

- *The costs are determined throughout the project development phase, there is a 5% limit on esthetic features. The other elements of CSD may add project cost.*

- *Depends on facility whether Interstate, NHS, or State and scope of work- (recon, rehab, or new, or maintenance).*
- *We have an average cost per mile, but we don't typically scope projects to stay within a certain dollar amount. Scope of work is depended on Purpose and Need. If funding is not available for the recommended scope of work, improvement types may be sequenced to do minimal improvement (i.e. pavement overlay) now and the major improvement (i.e. reconstruction) later when funding is available based on other needs in the state.*
- *This explanation is for Question 20. Of course, we have a Project Cost Budget. All projects have a budget! (nothing to do with CSS - just good Project Management and any DOT that does not have project budgets should be dissolved!!)*
- *We have planning/construction estimate guidelines, but they are not values that arbitrarily limit project cost.*
- *On average paving costs run \$x/mile. That gives us a ballpark number. When we get significantly higher or lower costs, we look at why. \$400,000 per lane mile which means a two lane roadway would cost \$800,000 per lane mile.*

22. Does your agency have a cap on enhancement costs or have a policy to determine acceptable enhancement costs?

Responses Yes – 11 No – 15

23. Does your agency try to manage public expectations related to projects?

Responses Yes – 25 No – 3

24a. Does your agency use visualization, simulations or models on a routine basis to promote public understanding/support of projects?

Responses Yes – 21 No – 6

b. Have these tools proved to be effective?

Responses Yes – 24 No – 0

25. Does your agency work in teams on CSS projects?

Responses Yes – 24 No – 3

If yes, are the teams multi-disciplinary?

Responses Yes – 24 No – 0

26. Does your agency use CSS on all projects?

Responses *Yes – 15 No – 12*

27. Does your agency have a program or a set of practices to promote context-sensitive construction?

Responses *Yes – 13 No – 14*

28 Has your agency established a method for tacking environmental commitments and other project commitments made to the public/stakeholders?

Responses *Yes – 18 No – 9*

29. Has your agency established a method of informing contractors of those commitments during the letting process?

Responses *Yes – 20 No – 6*

In pre-bid meetings?

Responses *Yes – 14 No – 6*

30. How does your agency familiarize construction contractors/personnel with environmental/project commitments? **20 SHAs Responding**

- *Through the project plans and specifications (3)*
- *Prior to beginning construction, the resident engineer is to review all permit requirements & environmental commitments with the district's environmental office and these are to be discussed with the construction contractor at the preconstruction conference and reviewed in the field.*
- *___ DOT lists those commitments in the contract.*
- *Through Notice to Contractors in the specifications and conditions in permits.*
- *Our Construction personnel are involved in the design reviews and decisions. They direct the contractor accordingly.*
- *Through the permitting process. Permit requirements are placed within the contract documents.*
- *In the Plans, Special Provisions, Permits and Pre-Construction Conferences (and in workshops).*
- *Through environmental documentation in which the construction oversight personnel would have participated/been aware and through personal contacts during plan development.*
- *Special provisions in the plans package and discussions at Pre-Construction meetings.*
- *Through plan documents, field visits and environmental oversight during construction.*

- *Preconstruction meetings in the field with environmental officers, and "green sheets" in plans.*
- *Special provisions are added to the contracts, plans and specifications to outline what is expected of the contractors.*
- *Mandatory pre-bid meetings & follow up training for CS3 Certification (OTIA III Bridge Program).*
- *Contract Special Provisions developed from Mitigation Reports, pre-bid meetings.*
- *Pre-bid meetings and supplemental specifications to the contract*
- *Plan notes.*
- *Usually through the contract documents themselves and specific environmental permits. Some training in executive storm water management/erosion control activities is also provided.*
- *Each of our regions has specific staff that is responsible for this.*
- *Through training.*
- *Through pre-construction meetings.*

31. Does your agency have contractor qualification requirements that address context-sensitive construction issues?

Responses *Yes – 3 No – 23*

32. Does your agency involve its maintenance/operations officials in project decision-making?

Responses *Yes – 20 No – 5*

If yes, when are they brought into the process? **17 SHAs Responding**

- *That depends on the project. Maintenance is involved throughout preventive maintenance projects. New construction/reconstruction/rehabilitation, typically involve maintenance at startup and various review stages. If it is a very simple signing type project they may not be involved at all.*
- *The agency guidance states that maintenance and operations personnel involvement from conception through construction in the project development process is essential.*
- *At various stages of project development (2).*
- *Through design reviews and pre-design meetings.*
- *During the design process; they are included in the plans reviews (30%, 60%, 90% & Final).*
- *They are a member of the design team and are encouraged to participate in all milestone reviews.*
- *Part of scoping team and part of project reviews.*
- *Not consistently-it depends largely upon the district project manager and personnel. Limited amount and depends on particular circumstance of the project; projects are discussed during development with personnel having*

overlapping areas of responsibility between planning, construction, & maintenance even though there is not a formal process.

- *District Maintenance personnel are involved in project nomination and they participate in plan reviews throughout the project development.*
- *As a member of the Project Development Team.*
- *Scoping, Design Field View stage, Final Design Office meeting, other project specific special meetings.*
- *During the initial phase of the project development process by way of a multi-disciplinary scoping meeting to "kick -off" the project.*
- *During the Scope process field personnel are included in the decision making as projects are added to the STIP so the correct improvement is done based on identified needs.*
- *Late in the (project development) process though this is something we want to change.*
- *We have multi-disciplinary teams on all or our projects. Depending on the project, Maintenance is brought in during the Environmental Phase sometimes, Plan-In-Hand Phase sometimes, PS & E Phase sometimes. Maintenance is actively involved in Project Development on a project by project basis.*
- *Usually at project scoping. They become a member of the project development team.*
- *They are on automatic player at the decision making table.*

33. Does your agency seek to involve local governments in routine maintenance of context-sensitive features along roadways or in maintaining specific project enhancements (e.g. via MOUs)

Responses *Yes – 24 No – 4*

34. Does your agency employ special maintenance procedures on projects employing context-sensitive features (or more attentive maintenance)?

Responses *Yes – 14 No – 13*

35. Has your agency established performance measures for evaluating the implementation/benefits of context-sensitive initiatives on projects?

Responses *Yes – 4 No – 22*

If yes, what procedures/guidelines are used? **8 SHAs Responding**

- *The agency is currently conducting a study to quantify how design factors promote traffic calming and other safety-related changes in driver and pedestrian behavior, add economic value to areas adjacent to highways, affect safety, utilizing accident data and the associated economic factors.*
- *Through out Project Evaluation Team projects are reviewed.*

- *We do customer service surveys in local jurisdictions to assess project success. SHA business plan also addresses components of CSS.*
- *Working on them.*
- *We have recommended them but they were not adopted due to concerns regarding time commitments for measurement.*
- *We are just now beginning to develop (would love any thoughts on it).*
- *CS3 guidebook, CS3 Framework (OTIA III Bridge program).*
- *Public Involvement Plans for each and every project, Project Managers, Region Directors, and many others have CSS commitments in their personal Performance Plans.*

36. Is post-project auditing of CSS commitments performed by your agency?

Responses *Yes – 8 No – 20*

If yes, who performs it? **8 SHAs Responding**

- *Design, construction, and maintenance staff perform several types of reviews on projects during construction for streamlining future projects, this includes review of commitments made with internal & external stakeholders during planning and project development.*
- *In-house personnel within our engineering office. The project evaluation Team (PET) performs the evaluations which include stakeholder questionnaires.*
- *Performed by design and construction personnel.*
- *Only informally and inconsistently if it is done it is done by a project manager or project landscape architect.*
- *We have consultants monitor our wetland mitigation sites. Other commitments are audited more informally by the designers or district personnel. Local stakeholders also perform follow-up audits and give us feedback (positive and negative).*
- *Consultants and __DOT program management staff.*
- *Independent Oversight Program performed in cooperation with FHWA and Bureau of Design.*
- *Project Managers, Resident Engineers, Public Involvement Coordinators (PIC's) and Environmental Supervisors ensure all commitments, including CSS commitments are performed.*

If yes, are those evaluations considered on a project specific basis?

Responses *Yes – 8 No – 0*

If yes, is there an attempt to evaluate them on a program (state-wide basis)?

Responses *Yes – 5 No – 4*

37. Does your agency hold internal meetings or other formalized processes to discuss CSS activities/potential improvements (i.e. continuous improvement)?

Responses *Yes – 18 No – 9*

Training/Information Exchange

38a. Does your agency have a comprehensive CSS guidance manual?

Responses *Yes – 7 No – 19*

If no, would your agency benefit from a comprehensive guidance manual?

Responses *Yes – 9 No – 9*

b. If a CSS guidance manual would be beneficial, which of the content areas would be of interest? **15 SHAs Responding**

1. *Project development process – 15*
2. *Public and stakeholder involvement – 15*
3. *Design and solutions – 14*
4. *Safety and liability – 13*
5. *Addressing environmental issues – 14*
6. *Involving agency construction and maintenance – 14*
7. *List others/comments*
 - *Tools for stakeholder ID & involvement at all phases of planning and project development; development of complete & cross functional multi-disciplinary projects; development teams in planning & project development; connecting planning & project development processes more effectively.*
 - *Building context for the project area - we are currently working with a university that is developing guidelines for our use in this area under the CSS Bureau Chiefs guidance in Planning, Development/Design, Construction, Maintenance and feedback and marketing of CSS.*
 - *Planning and NEPA*

39. Does your agency offer context-sensitive training (introductory or advanced) for agency personnel, consultants or stakeholders?

Responses *Yes – 18 No – 10*

40. Does your agency train/involve consultants and contractors with CSS-related practices?

Responses *Yes – 17 No – 8*

41. Has your agency developed training for contractors/agency personnel related to compliance with environmental/project commitments?

Responses Yes – 18 No – 10

42. Does your agency partner with other state highway agencies to share information/experiences about CSS?

Responses Yes – 17 No – 10

If yes, what types of forums are used for information exchange? **14 SHAs Responding**

- *E-mail, websites, phone calls, awards programs, conferences, trainings, magazine articles.*
- *Surveys such as this one.*
- *University of _____ Outreach - Thinking Beyond the Pavement*
- *AASHTO*
- *We share case study examples on specific projects. We receive survey requests. We respond to specific information requests regarding both process and product related items.*
- *Training, Workshops, Peer Exchange, Functional Group Meetings and forums.*
- *Most common form of exchange is the various AASHTO meetings. We also held the 2005 WASHTO conference which included presentations on CSS. We held a "Thinking Beyond the Pavement" Workshop in conjunction with a CSD conference in 2001 that was open to all interested parties, including other states.*
- *AASHTO Environmental Design Committee and other personal contacts.*
- *We are partnered with the Center for _____ at _____ University. We work with them regularly to provide recognition and assistance to others.*
- *AASHTO Regional Meetings, ad-hoc meetings/requests for information.*
- *AASHTO, NASTO*
- *Conferences, Peer Exchanges*
- *Local and national conferences. Recently partnered with state transit authority and provided a CSS panel discussion and Presentations at RAIL VOLITION.*
- *AASTO, Green Highways Initiative*

43. Is your agency working with in-state universities to promote the instruction of CSS to engineering students?

Responses Yes – 11 No – 17

Problems/Concerns

44. If your agency has implemented or is implementing CSS, what are the major concerns/problems you are addressing? Check appropriate categories and add any others that you feel apply. **31 SHAs Responding**

<i>Issue</i>	<i>No. of SHAs Responding</i>
<i>a. Manpower to perform CSS project development</i>	<i>10</i>
<i>b. Adequate funding for projects</i>	<i>11</i>
<i>c. Guidance related to liability issues</i>	<i>10</i>
<i>d. Procedures/techniques to address CSS issues</i>	<i>11</i>
<i>e. Effective training for staff and consultants</i>	<i>16</i>
<i>f. Extra time necessary to develop projects using CSS</i>	<i>10</i>
<i>g. Cooperation with other stakeholders including local governments and planning organizations</i>	<i>15</i>
<i>h. Concern over stakeholder demands/expectations</i>	<i>18</i>
<i>i. Others (List)</i>	
• <i>Management support for CSS principles/processes (2)</i>	
• <i>Different opinions by stakeholders & DOT on success</i>	
• <i>Creating buy-in across the DOT</i>	
• <i>Adequate performance measures for CSS</i>	
• <i>No concerns</i>	

45a. Does your agency have liability concerns due to/as a result of implementing CSS?

Responses *Yes – 15 No – 10*

b. Do the relevant personnel in your agency possess a reasonable degree of understanding of issues related to liability and flexible design?

Responses *Yes – 18 No – 7*

c. Has any legal action been taken as a result of using CSS principles or flexible design?

Responses *Yes – 1 No – 23*

Benefits

46. Have there been any benefits experienced? (e.g. less public opposition to projects, reduced project development time....)

Responses *Yes – 23 No – 3*

If yes, give an example. **18 SHAs Responding**

- *Many project managers/designers have given testimony that early public involvement in their projects actually makes project delivery more efficient by solving the problems early before they become bigger issues later.*
- *More aesthetically pleasing projects, better buy-in from affected parties. CSS promotes stake holders and earlier involvement which makes the process easier.*
- *By involving all the stakeholders and making them a part of the process we get better buy in for the project and process.*
- *Stronger working relationships. More community pride in the projects. Community commitment to maintain amenities.*
- *Increased trust and improved relationships, more projects with balanced success resulting from applying more flexibility in design, avoidance of rework cycles and rework costs.*
- *The ability to make commitments during the environmental clearance phase that are valid through design/construction/maintenance has gained trust & promotes positive collaborations with the stakeholders which enhances a successful project development effort.*
- *The most prominent set of projects with CSS could not have been constructed without incorporating CSS.*
- *The projects were opposed by Tribal leaders and were held up in the NEPA process until DOT coordinated and cooperated using CSS techniques. Projects that were stalled went to construction after we restated the development process using CSS techniques and methodology.*
- *But the benefits are difficult to measure because of the lack of good data (including performance measures)*
- *The public seems to be more in tune with a project if they are involved and seem to have a say in what goes into a final project. Programmatic environmental permitting - worked with all natural resource agencies to streamline permitting process for entire _____ bridge program.*
- *Significantly reduced length of project development; project bundling also reduces length of project development; increased public involvement (tier assessment process) has reduced public opposition to projects - received early buy - program goals such as hydraulic opening and fluvial performance standards.*
- *Less public opposition when the typical section has been modified to utilize narrower lanes, narrower medians, and landscaping thru residential/developed corridors.*
- *Less public opposition.*
- *Overall improvement in public trust and satisfaction measured by statewide customer surveys.*
- *The ___ project is one project where public support for the project improved and grew thru the implementation of the CSS philosophy during planning (environmental document), design and construction.*

- *On some high profile projects there has been less public opposition because of more demonstrable opportunities for public input to create value for the projects.*
- *Reduced project development time, smoother transition from planning to design and construction.*
- *It has required less energy to arrive at an agreeable solution. There is a spirit of cooperation versus the spirit to do battle.*

47. Has there been a change to your agency's overall CSS project costs?

Responses Yes – 9 No – 15

If yes, give an example. **4 SHAs Responding**

- *Public involvement cost*
- *_DOT's basic approach to finding a 'solution' during a transportation study involves a great deal of public involvement and search for ways to avoid/minimize impacts. We often include flexible design, design treatments, and such as a part of a 'Commitment Sheet' linked to use of Federal funds.*
- *Planning studies: Transportation System Plans, Transportation Growth Management Studies, Refinement Studies, Access Management Plans, Traffic Mobility/Traffic Control Plans, Project Teams with multi-disciplinary and local government members, Flexible design.*
- *__DOT has a Public Involvement Plan created for significant projects. This plan involves identifying public involvement team members and the tools we use to outreach to the public. This plan could involve project initiation ads, project if brochures, survey flags, 800 numbers, internet webpage, mailing lists, newsletters progress bulletins, fliers, project posters, public service announcements, radio spots/interviews, press releases, church contacts, CAD visualizations, or other project videos.*

General/Survey Comments

48. Please provide any other comments you feel would be beneficial to share with other states implementing or considering implementation of CSS. **10 SHAs Responding**

- *Building context for the project area - we are currently working with a university that is developing guidelines for our use in this area under the CSS Bureau Chiefs guidance in planning, development/design, construction, maintenance and feedback and marketing of CSS.*
- *How do other states resource planning and project development processes to ensure adequate stakeholder involvement? How much or how little stakeholder involvement is enough? How do other states develop effective cross-functional project development teams?*
- *Communication and training of stakeholders would inform them that CSS does not mean the designers will do whatever the public wants.*

- *Implementing CSS involves an organization culture change. It takes time and commitment. It requires a multi-disciplinary approach and needs to include stakeholders at the earliest stage. Measurement will be the key to success. If measurements are only done by the end result then CSS will be difficult.*
- *Comprehensive training is the most important thing you can develop, deploy and continually build upon to make a difference. It must be comprehensive and interactive to apply lessons learned.*
- *Adequate training and documentation in design manuals is essential to full implementation of CSS. Although we have a policy in place to implement CSS, not all designers are aware of the many nuances of CSS.*
- *Before CSS or CS3 can be fully successful, it has to be embedded into the project decision making process at every level for every discipline.*
- *Formalize and maintain a communication bridge between Planning agencies and Design*
- *Meet with interested parties of the project early and get their input on purpose and need BEFORE scoping. Then, CSS is natural and can be negotiated better.*
- *You must have multi-disciplinary teams on projects in order to implement CSS. You must involve the public. They are a cornerstone of the CSS philosophy. CSS is NOT a line item on a project. It is NOT an aesthetic add on.*

49. Please provide any additional comments or questions you may have. **8 SHAs Responding**

- *Context Sensitive Solutions have been required on all FHWA projects since 1970 as part of the required environmental/public involvement processes. Environmental training that includes public involvement is offered for our agency personnel as well as private consultants and contractors. Nearly all of our projects are federally funded and our few non-federal projects typically follow the environmental/public involvement requirements of federally funded projects, so all projects are CSS.*
- *Some question alluded to CSS as an add-on or not applicable to all projects (e.g. # 33 & 34: "CSS features"). CSS is stakeholder involvement, it applies to all projects, it isn't a synonym for enhancements that "cost more" - it is a process, which if done correctly, can save money by addressing stakeholder issues early thereby avoiding costly rework later. # 45 is misleading, CSS doesn't lead to liability-bad engineering judgment does.*
- *Questions 11 and 12 are both yes, but this yes really applies to major types of projects, such as capacity improvements, that go through a higher degree of project development. The yes probably does not apply to most 3R projects.*
- *As a point of information not included in the survey, _____ DOT has utilized portions of what's considered CSD/CSS for some time now. We are in the process of "formalizing" these practices with the creation of a web-based CSD/CSS guidance manual and website. We are in the final stages of the*

effort and it should be up and running within the next month or so. Please feel free to contact me if you have any questions.

- *The __ DOT adopted its CSS Policy on August 1, 2005. The Department has completed the implementing procedures for the division of highways and is working on procedures for the Division of Aeronautics, the Division of Intermodal and Public Transportation, and the Office of Planning and Programming. We have developed three training course over the past year, a half-day Awareness Class for supervisors, a two day Approach Class for staff that work on CSS projects, and a half-day class for local agencies. The local agency class begins this month, the Awareness class begins in May, and the Approach class in July. Communication and outreach are continuing with two state wide general stakeholder meetings in May. Our __DOT CSS website is being updated continually also.*
- *Comment to # 38: We don't have a comprehensive CSS guidance manual, but guidance materials and policies are in place, see: www.sha.state.md.us/businessWithSHA/projects/ohd/Mainstreet/MainStreet.pdf. Comment to # 40 we don't have formal training for consultants and contractors. However, they conduct 85% of our work and through SHA management of its program they receive on-the-job training, including CSS training. Comment to # 43: Numerous internship opportunities are available for students.*
- *Some questions are difficult to answer. __DOT does not have legislation or Executive Order, however its efforts were initiated as a result of an Executive Directive. We are currently conducting awareness training and have presented to various other municipal agencies and the Consultant Engineers Community. We have trained over 600 department staff and will continue our training programs. A team of 65 stakeholder organizations were directly involved in our policy development.*
- *It should be noted that a lot of CSS can be equated to good engineering. Much of what we do daily in designing a reconstruction project involves CSS, but it is not necessarily called CSS. We look at various alignments to avoid or minimize impacts on environmentally sensitive areas, we include sidewalks or bike paths as appropriate, we review our projects in the field with proposed plans in hand to determine how a proposed realignment or new bridge will look, and we involve the public.*
- *We are currently working to transform CS3 knowledge from the OTIA III Bridge Program into __DOT mainstream. Decisions are pending regarding the level of implementation. We have been using the Flexibility in Highway Design manual for CSS for 9 years on __DOT projects. CSS is a basic approach to the transportation planning activities in the State. __DOT partners very closely with local government, the public, the business community, and other stakeholders in planning studies that identify potential transportation solutions before projects are programmed. Once projects are programmed, Project Teams are established with members from various __DOT disciplines and local government.*

- *The survey was pretty good, but it could have provided more "explanations or If Yes" to improve the responses. At times, the questionnaire seemed to treat CSS as a line item.*
- *This survey seems to imply that CSS projects are different in their scope. We believe that CSS is more of a process than an outcome. If the process is applied as a matter of practice, then all projects are CSS.*

Table 1. State Highway Agencies Responding to the Kentucky
Transportation Center Context-Sensitive Solutions Survey

Alabama
Alaska
Arizona
Arkansas
California
Colorado
Connecticut
Delaware
Florida
Georgia
Hawaii
Illinois
Indiana
Maryland
Michigan
Minnesota
Mississippi
Montana
New Hampshire
New Mexico
North Carolina
North Dakota
Ohio
Pennsylvania
Rhode Island
South Carolina
South Dakota
Tennessee
Utah
Virginia
Washington
Washington, D.C.
Wyoming

4.0 Context Sensitive Construction and Context Sensitive Maintenance Training Course



This workshop was prepared by the Kentucky Transportation Center Context-Sensitive Solutions Team: Don Hartman, Jerry Pigman and Ted Hopwood. It is intended to provide transportation agency personnel involved in Construction and Maintenance with information about Context-Sensitive Solutions (CSS) and actions they should take to incorporate it into their routine activities to supplement and support it. Those collective actions comprise Context Sensitive Construction (CSC) and Context Sensitive Maintenance.

The backdrop shows the removal of a rare type of topsoil (Marnie Loam) on the Paris Pike (US 68) project between Lexington and Paris, Kentucky. After the roadway grade was completed, the topsoil was re-deposited along the ROW.

CSC Workshop Learning Objectives

- CSS and its benefits **30 minutes**
 - Define CSC and explain its importance in implementing CSS
 - Define CSM and explain its importance in continuing context sensitivity after a project is complete
- Construction & Maintenance function on CSS projects **1 hour & 45 minutes**
- How Maintenance can employ CSS principles on projects/facilities **1 hour**

The CSC&M workshop is aimed primarily at transportation agency Construction and Maintenance personnel from both the Central Offices and Districts including resident engineers and their crews along with maintenance personnel.

The first module will provide a basic introduction to the concept of context-sensitivity on highway projects will be presented. Context Sensitive Construction and Context Sensitive Maintenance will be defined along with their roles in fully implementing CSS. A hypothetical case study will be introduced.

The second module will explain the function of Construction and Maintenance on transportation agency CSS projects. Examples will be provided on the roles of Construction and Maintenance personnel in promoting CSS during construction. The case study will be addressed in four parts providing examples of issues that may require decision-making by transportation agency Construction (and possibly Maintenance) personnel.

The third module is for DOT Maintenance personnel that develop projects, oversee in-house or non-project contracts or manage facilities.

Transition in Project Development

- NEPA (1969)
- ISTEA (1991)
- NHS Act (1995)
- Context Sensitive Design (1998)
- Context Sensitive Solutions (2000)

Over the past 40 years, the Federal government has promoted improved decision making on Federal actions beginning with the National Environmental Policy Act of 1969 (known as NEPA). Since 1969 many laws, presidential orders, and state and Federal policies have been enacted to supplement and enhance NEPA.

Both state and Federal government transportation agencies have sought to better implement NEPA and to promote transportation projects in harmony with communities and the national environment. The most important of these from a national standpoint are the development of Context Sensitive Design and its overarching successor Context Sensitive Solutions. These initiatives are relatively new. Many state transportation agencies have adopted the tenets of Context Sensitivity for various stages of their project development processes.

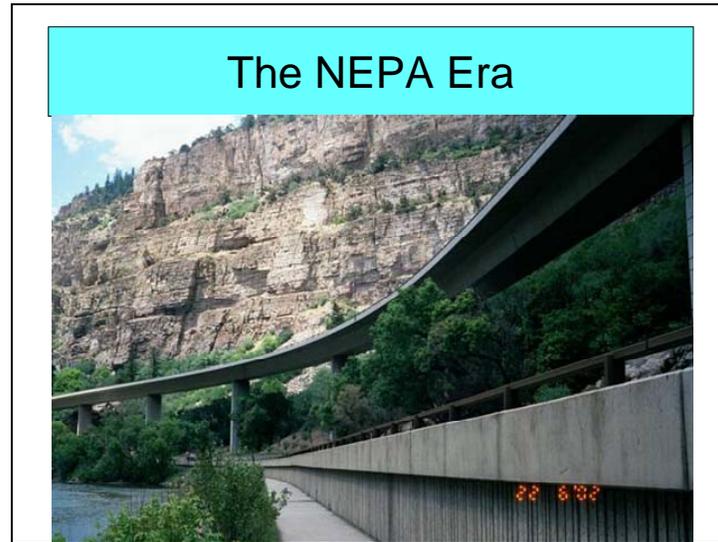
National Environmental Policy Act of 1969

- Declaration of national environmental policy
- Establishment of action-forcing requirements
 - interdisciplinary approach to planning
 - appropriate consideration of environmental factors
 - preparation of environmental impact statements
- Impact on Federally funded transportation projects

The National Environmental Policy Act of 1969 was passed by Congress to regulate the environmental/community impacts of Federal actions (including Federally funded transportation projects). It required Federal agencies to look beyond the narrow focus of benefits from a proposed action and determine the potential impacts of that action on society, economics and the environment.

To ensure compliance with this law, Congress mandated that each Federal agency establish an environmental review process that included multi-disciplinary input, environmental reviews, and a balanced decision making process. Each Federal agency has its own NEPA process. For Federally funded transportation projects, state highway agencies have to address the Federal Highway Administration NEPA. All project-related investigations must have approval of the Federal Highway Administration. Those approvals are based upon NEPA review documents (Environmental Assessments, Environmental Impact Statements, FONSI, and Categorical Exclusions) submitted to the Federal Highway Administration by the state transportation agency.

Slide 5



NEPA had far-ranging effects on Federally funded transportation projects. State transportation agencies created environmental divisions and rigorously prepared the Federally required documentation. The project stakeholders/ public were made more aware of the proposed actions. There was better compliance with environmental regulations of resource agencies.

Some projects such as the well-known I 70 at Glenwood Canyon, CO (above) gained national and international acclaim for balancing transportation, environmental and public interests. Typically, those projects involved state transportation agencies going the “extra mile” in planning and design to ensure that stakeholder/public concerns were addressed. The governor of Maryland issued an official order for state agencies to address stakeholder/public concerns about their actions leading to the Maryland DOT’s “Thinking Beyond the Pavement” initiative. Those efforts had a common thread, but there was no formal nationally recognized procedure that instituted or promoted these actions.

Picture Credit -Matthew Salek at <http://www.mesalek.com/colo/glenwood/index.html>

“Thinking Beyond the Pavement”
*A National Workshop on Integrating
Highway Development
with Communities and the Natural Environment*

- Developed a new approach to project development
 - Identified supporting methods/practices
 - Assembled those into a coherent practice
- Term for new approach:
 - **“Context Sensitive Design”**

In 1998, a key workshop was held in Baltimore, MD sponsored by the Maryland DOT, the FHWA and AASHTO. The objective of that workshop was to bring together all of the beneficial practices employed by transportation agencies to make transportation projects fit better into communities and the natural environment. Transportation agencies also sought to address the sources of contention that had plagued project development in the NEPA Era.

The meeting participants developed a set of principles with supporting methods and practices that formed the basis for a coherent approach to making transportation projects fit into communities and the natural environment. That approach was termed “Context Sensitive Design” to emphasize the additional efforts needed in stakeholder/public involvement and flexibility in design to identify key issues and provide projects that were sensitive the environment in which they were constructed. Several contributing FHWA documents from that period include:

Public Involvement Techniques for Transportation Decision-Making (1996)

Flexibility in Highway Design (1997)

Context-Sensitive ??

Definition (adj.) : Depending upon the context/circumstances.

Every transportation project is in a different location with unique contexts.

The term “Context-Sensitive” provides an important insight into the direction of this workshop and the basis for understanding major agency actions incorporating it. Context-sensitivity pertaining to this workshop means the circumstances surrounding a project. The “Context” of a project depends upon its location and potential to impact communities and the natural environment. Each location where a project is to be constructed is different and, as a consequence. In different locations the same action can have dissimilar impacts. The recognition of the varying factors and the actions needed to satisfactorily address the potential impacts of a project (along with the willingness to address them) pertain to the word “Sensitive”.

Definition Source: <http://en.wikipedia.org/wiki/Context-sensitive>

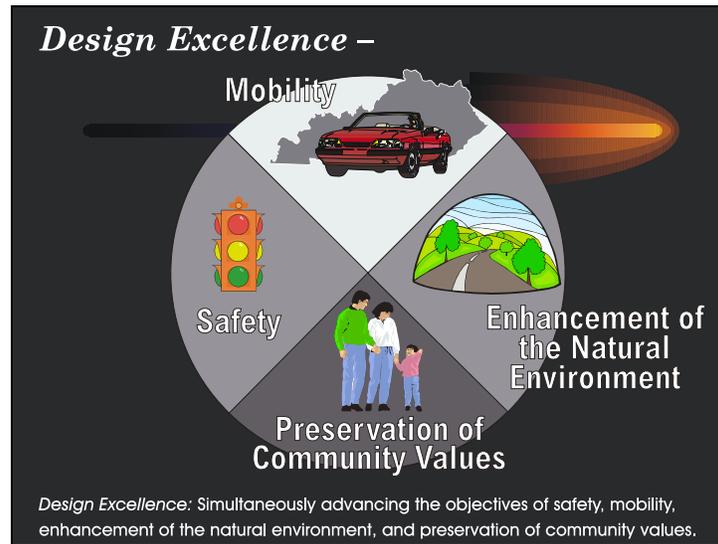
Features of Context Sensitive Design

- Stakeholder/public involvement
 - Establish the contexts in which a project will be placed
- Flexible design
 - Collaborative, interdisciplinary decision-making
 - Exploits range of options in design guides
 - Provides “Design Excellence”

At a 1998 Maryland Conference, federal and state transportation officials along with other key attendees reviewed existing PD practices that provided improved harmony with communities and the natural environment. They merged those into a unified methodology termed CSD.

The then-current focus of that initiative was related primarily to PD actions in Planning and Design in an effort to promote projects that were acceptable to the public and resource agencies based upon : 1) public involvement in decision-making (or some elements thereof) and 2) flexible design that balanced environmental and economic issues with transportation requirements.

Slide 9



At the Maryland conference, “Design Excellence” was defined as designing projects that balanced transportation objectives with those of communities and the natural environment. It embodied the use of transportation planning and design to implement the decision-making process originally envisioned in NEPA.

Context Sensitive Solutions

- Superseded CSD
- Emphasizes context sensitivity throughout the PD process
 - Including **CONSTRUCTION**

In the early 2000s, CSD began to be commonly replaced with a more inclusive term- Context Sensitive Solutions. The parties that had coined “Context Sensitive Design” were primarily focused on the early phases of project development (i.e. planning and design). Subsequently it was recognized that other vital context sensitive activities occurred within the PD process and that those needed to be recognized. “Context Sensitive Solutions” was applied to address that perceived shortcoming.

The current FHWA definition of CSS is:

Context Sensitive Solutions (CSS)— is a collaborative, interdisciplinary approach that involves all stakeholders to **develop a transportation facility** that fits its physical setting preserves scenic, aesthetic, historic and environmental resources while maintaining safety and mobility. CSS considers the total context within which a transportation improvement project will exist.

What is the goal???

- Find a “best fit” solution for the **context**:



One that meets the expectations of the transportation agency and stakeholders, as well as the community and natural environment.

While, many benefits might be attendant to applying the principles of CSS, the question is -- what is the GOAL. The goal centers on finding the “best fit” solution to the transportation problem with full attention to the unique context. That problem with its context should be made explicit in the project’s purpose and need statement.

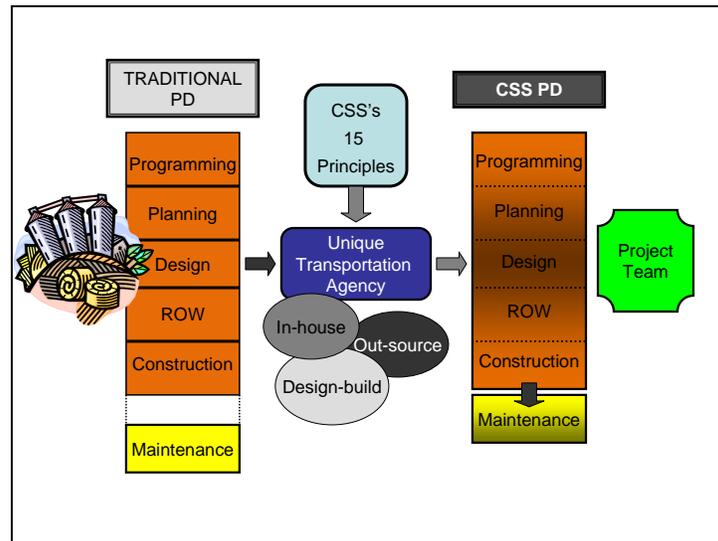
The best fit solution is a judgment made by the transportation agency with the benefit of knowledge from various stakeholders and the public that meets (or maybe even exceeds) expectations of all the interests. It usually represents the consensus solution – the one that most can accept for the unique project situation.

A Kentucky project manager has said that CSS is: “just a matter of doing the right thing, in the right place, at the right time.” In Colorado the Chief Engineer has stated in a CSS policy memo that:

Our day-to-day work...should respect community values and should be sensitive to the unique context of each community. **By partnering and collaborating on a multi-disciplinary basis with each community, we will find ways to achieve our transportation objectives while at the same time respecting local values. We will often enhance what makes that community special for the people that live there. Our projects should be seen as having added lasting value to the community. Our end result should**

exceed our expectations and those of community members, and should achieve a level of excellence in people's minds. (emphasis his)

Slide 12



Just as a project's context is unique, the transportation agency has its own uniqueness potential for project delivery (PD) using the principles of CSS. The very process and procedure of project delivery can vary by size and type of project for transportation agencies. Some large projects may be handled out of a central office while smaller projects are delivered through district offices. Different phases may be outsourced or completed by agency personnel. Some projects may even be delivered using design-build "unit" contracting. Even when projects are done in-house some may be carried out by teams while others in the same agency are processed through functionally "siloes" units. At least three core CSS principles impact the process and procedure of project delivery:

use of interdisciplinary (project) teams

involve all stakeholders

track and meet all (project) commitments

Each of these principles contribute to finding and delivering the best fit solution. The uniqueness of the transportation agency may also be seen in which other principles of CSS it chooses to apply and the extent to which they are applied (or pursued).

Knowing the Principles

1. Use of interdisciplinary teams 
2. Involve stakeholders 
3. Seek broad-based public involvement 
4. Use full range of communication methods 
5. Achieve consensus on purpose and need 

Knowing the Principles

6. Utilize full range of design choices



7. Address alternatives and all modes



8. Maintain environmental harmony



9. Address community & social issues



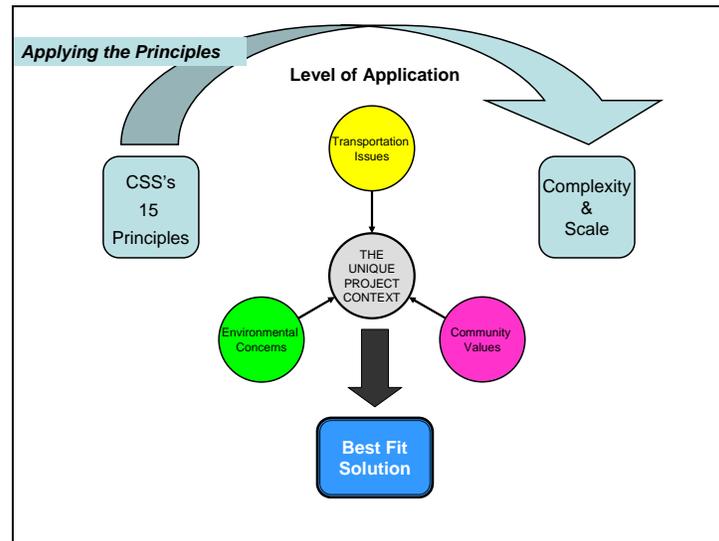
10. Address aesthetic treatments & enhancements



Knowing the Principles

11. Consider a safe facility for users & community 
12. Document project decisions 
13. Track and meet all commitments 
14. Create a lasting value for the community 
15. Use all resources effectively (time & budget) 

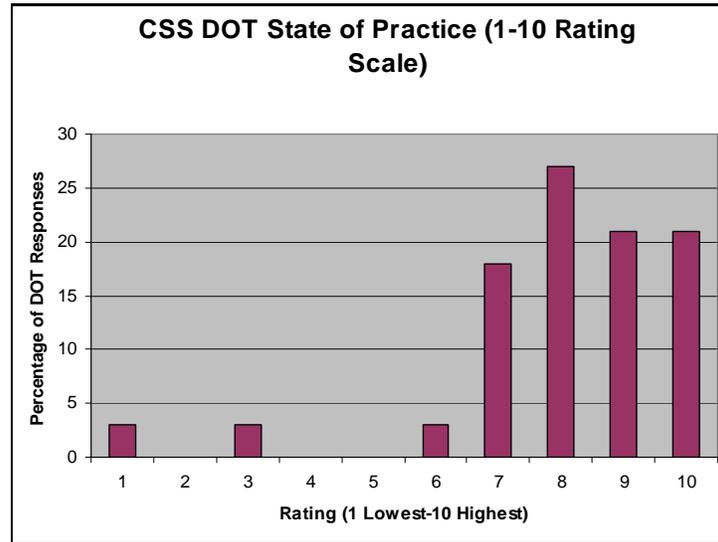
Slide 16



While transportation agencies typically select which principles to apply it is the complexity and scale of the unique project (context) that should determine the level of application (or extent needed). Unique contexts are primarily determined by the interplay of transportation issues (such as safety, mobility, connectivity) environmental concerns (social and physical) and community values (sense of place, unique character, settlement pattern) . So if the community is small and compact and the transportation issue is the need for a 2-lane bridge replacement the project will be uniquely different from a 20 mile 4-lane highway through a rural area concerned with maintaining its rural character and historic features. The composition of a project team and the extent and make-up of stakeholder/public involvement should be significantly different – while both endeavors seek to find the best fit solution.

Levels of Application (stakeholder/public involvement)			
 <p>Louisville</p>	<p>Context</p> <ul style="list-style-type: none"> • Linkage KY-IN • River City • Waterfront park 	<p>Stakeholders</p> <ul style="list-style-type: none"> • Prop. Owners • Econ. Dev. • SHPO • Jurisdictions 	<p>Solution</p> <ul style="list-style-type: none"> • Continuous arch structures (selected by stakeholders/public from 30 designs)
 <p>Pisgah</p>	<p>Context</p> <ul style="list-style-type: none"> • Historic District • Near Keeneland • Bluegrass Area 	<p>Stakeholders</p> <ul style="list-style-type: none"> • Prop. Owners • SHPO 	<p>Solution</p> <ul style="list-style-type: none"> • Scaled down new concrete bridge with "decorative" trusses from old steel bridge
 <p>Flat Creek</p>	<p>Context</p> <ul style="list-style-type: none"> • Rural County • Historic? • Low volume 	<p>Stakeholders</p> <ul style="list-style-type: none"> • Prop. Owners • Design Team 	<p>Solution</p> <ul style="list-style-type: none"> • Concrete bridge with conventional design (no special treatments)

Levels of Application (environmental harmony)			
 <p><i>national forest</i></p>	<p>Context</p> <ul style="list-style-type: none"> • Ozark Mtns • Access/Scenic • Mulberry River • Gravel Road 	<p>Stakeholders</p> <ul style="list-style-type: none"> • US Forest Ser. • Scenic Rivers • Water Quality 	<p>Solution</p> <ul style="list-style-type: none"> • paved two-lane with low design speed, curb and gutter, terrain following and uses local rock for walls/gabions
 <p><i>rural countryside</i></p>	<ul style="list-style-type: none"> • Horse Farms • Rural Arterial • High Crash 2-L • Litigation 20yrs. 	<ul style="list-style-type: none"> • Prop. Owners • SHPO • The Judge • Jurisdictions 	<ul style="list-style-type: none"> • bifurcated hwy using wood guard rails and grass shoulders in rural and curb/gutter with core-10 rail in urban
 <p><i>urban village</i></p>	<ul style="list-style-type: none"> • Adj. to Downtown • Adjacent to UK • Chevy Chase • 4-L Re-stripe 	<ul style="list-style-type: none"> • Neighborhood • Bikers & pedestrians 	<ul style="list-style-type: none"> • striped for bike lanes on both sides and wide center turn lane with only two travel lanes



This chart is from a CSS survey conducted in 2006 by the Kentucky Transportation Center. Thirty-five responding transportation agencies rated their level of implementation of CSS. A rating of 1 indicated a DOT was not interested in CSS. A rating of 6 indicated a transportation agency was planning to adopt CSS. A rating of 10 indicated a transportation agency had implemented CSS for at least a year AND had addressed the practice with increasing proficiency (in terms of having CSS policies/employee training fully developed). Twenty-nine of the responding transportation agencies stated that they had employed CSS on projects for at least one year. Clearly, CSS will be an important practice for all/most transportation agencies in the future. It will play an increasingly more significant roles in many transportation agency activities.

Benefits of Employing CSS

- Improved project delivery
- Elimination of disruptive problems
- Better overall projects
- Improved relations with resource agencies
- Enhanced public perception of DOT
- Greater credibility of DOT
- Reduced overall project/maintenance costs
 - When coupled with continuous improvement

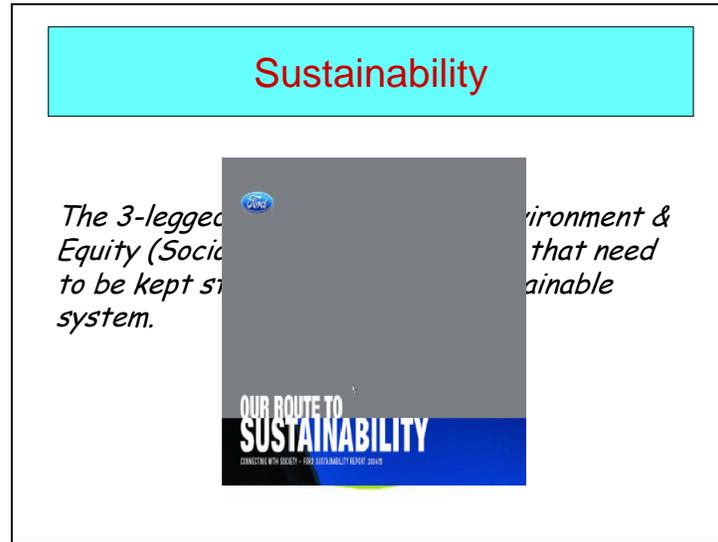
Transportation agencies realized that CSS entailed additional effort and expense beyond that normally applied to conventional project development. That input is justified by the benefits that can be realized in project development. Some transportation agencies limit the use of CSS to “big ticket” or controversial projects due to the added effort/costs and limited funds to address transportation needs. Others have applied CSS more or less “across the board” on all projects. It is anticipated that if transportation agencies fully institute CSS, they will become more efficient in its application and will derive cost-effective means of addressing context sensitive issues on a routine basis. That will further enhance the benefits of applying CSS by achieving reduced overall project costs. To fully realize those benefits, transportation agencies will probably have to incorporate CSS in continuous improvement initiatives.

Sustainability

Sustainability is meeting the needs of the present generation without compromising the ability of future generations to meet their needs (*Brundtland Report 1987*).

Sustainability is a separate issue from CSS. However, some transportation agencies are linking them to promote stakeholders/public concerns about the impacts of projects/ agency actions.

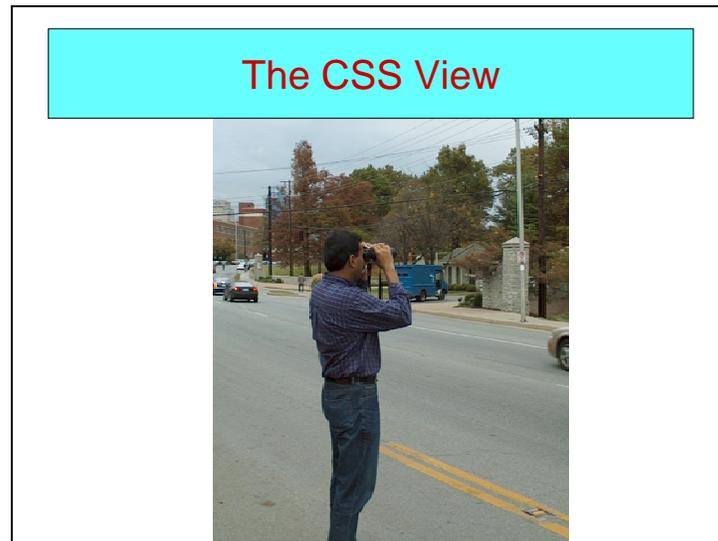
The Brundtland Report was issued by a committee established by the World Commission on the Environment and Development. It developed guiding principles for sustainable development as it is generally understood today. The Report was later debated in the UN.



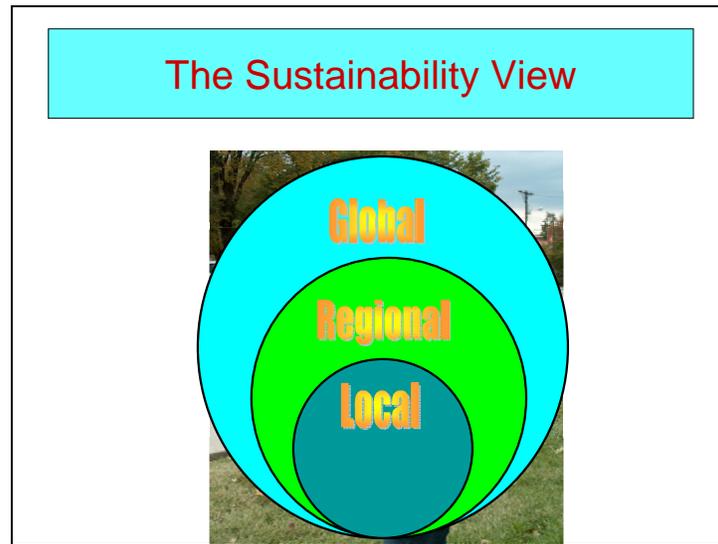
Sustainability addresses three factors related to development: 1) the economy (economic benefits), 2) the environment and 3) equity (social equity). Also known as the “3 E’s of sustainability”, these factors are also to be considered by NEPA reviews. Under NEPA, the benefits of a proposed Federal action (a Federally funded transportation project) must be weighed in relation to its impact on the “3 E’s”.

Insert: This is a document prepared by the Ford Motor Company related to that firm’s efforts to adopt sustainability. Many corporations and state governments have adopted sustainability as a corporate/ government policy.

Slide 23



CSS entails a transportation agency looking at the human and natural environment to see how a proposed project will best fit in.



Sustainability involves an “outside in” look at transportation projects to see how they will impact the “3 E’s” taking a long-term view.

Insert: Sustainability looks at these issues on a local, regional (national) and global basis.

The Role Sustainability in the PD Process (and Beyond)

- In developing projects that provide:
 - economic benefits
 - minimize environmental/social impacts
- In constructing projects in a sustainable manner
- In maintaining projects to preserve them with:
 - minimum societal costs
 - limited environmental impacts
- Oregon DOT award-winning CS3 initiative (Context Sensitive Solutions & Sustainability)

Elements of sustainability bear on some CSS PD process actions. However, its full emphasis must be accommodated by transportation agency policies and implemented at the highest levels of state government. In contrast, effective application of CSS can follow all sustainability principles. Such actions include

The use of environmentally friendly materials/practices

Reuse or recycling of scrap and wastes

Providing specific (targeted) economic benefits

Working with resource agencies to develop cost-effective actions

Preserving infrastructure elements instead of neglect/failure/replacement (proper asset management = good stewardship)

It does not require an executive branch mandate for full implementation of CSS.

Definition of Context Sensitive Construction

"**Context Sensitive Construction** is the continuation and advancement of the objectives of safety, mobility, enhancement of the natural environment, and preservation of community values into the construction phase of a project"

CSC can be visualized as extending CSS principles into the construction phase. In many cases, projects that are considered "maintenance" work are functionally assigned to Construction Divisions for oversight during field work. In those cases, A full PD process may not have been employed. Transportation agencies must address public involvement and other CSS issues on a "perceived needs" basis. That work must occur early on in the development of the maintenance project for proper implementation of CSS principles.

Major Objectives of CSC

- Preserving the human & natural environment
- Engaging stakeholders/public on construction projects/activities
- Minimal disturbance to motorists, the public & businesses
- Improving construction practices to promote sustainability & efficiency

We preserve the human and natural environments while preserving the transportation infrastructure. We reach out to stakeholders/public at every opportunity. We want to be as unobtrusive as possible while carrying out our assigned duties. We want to be “future friendly” and strive to get better at what we are doing by implementing a continuous improvement effort.

Definition of Context Sensitive Maintenance

"**Context Sensitive Maintenance** is the continuation of safety and mobility, the environment, and community values into the maintenance & operations of a facility"

CSM can be visualized as extending CSS principles into Maintenance (and Operations) of a transportation facility. In many cases, projects that are considered “maintenance” work are functionally assigned to Construction Divisions for oversight during field work. In those cases, the normal PD process may not have been fully employed. Transportation agencies must address public involvement and other CSS issues. That work must occur early on in the development of the Maintenance project for proper implementation of CSS principles. In those cases, CSC and CSM procedures may both be applicable as described later in this presentation. In other cases, transportation agencies may apply context sensitive principles for general maintenance activities and apply them to all facilities and facility elements.

Major Objectives of CSM

- Preserving the human & natural environment
- Engaging stakeholders/public on maintenance projects/activities
- Minimal disturbance to motorists, the public & businesses
- Improving maintenance practices to promote sustainability & efficiency

The objects of CSM parallel those of CSC. We preserve the natural and human environments while preserving the transportation infrastructure. We reach out to stakeholders/public at every opportunity. We want to be as unobtrusive as possible while carrying out our assigned duties. We want to be “future friendly” and strive to get better at what we are doing by implementing a continuous improvement effort.

How is CSM Different from CSC?

- CSC applies to CSS projects
- CSM applies to all maintenance activities

In project development many years may be spent in planning through construction. If it is a CSS project there may be items that the transportation agency needs to address into the facility operations phase (mostly maintenance actions). We don't stop with considering just new CSS-constructed facilities. We must look beyond those and consider ALL the facilities and actions conducted by the transportation agency. The transportation agency cannot be simply sensitive to communities and the natural environment when it wants to construct a new facility. It must engage the stakeholders throughout the service life of a facility and apply the same care when maintaining it. That concern and care helps all parties cooperate in the future in a constructive manner. In the end, it will result in better relations and even in enhanced efficiency in maintaining the transportation agency's entire infrastructure.

How is CSM Different? Cont'd.

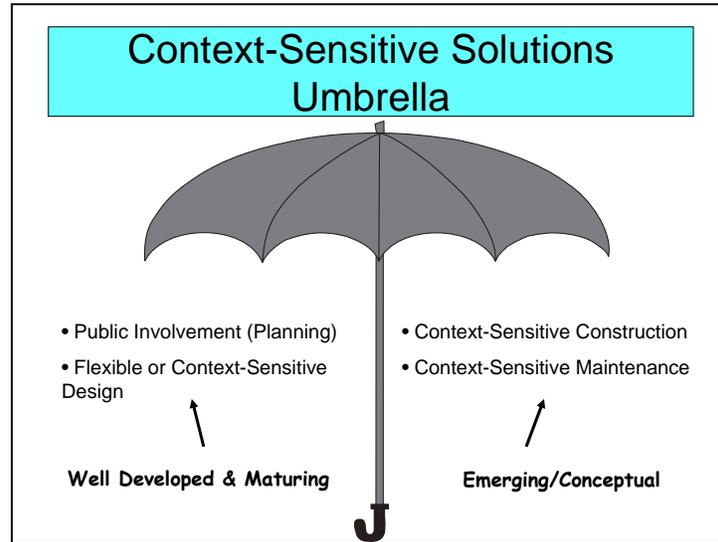
- CSC relates to projects developed using the CSS PD process
- **Maintenance may develop its own projects**
 - CSC may be applied to those projects

Depending on the transportation agency, CSC may apply to some/all projects that are developed through the normal project development process. Maintenance may develop its own projects that are overseen by Construction. If the transportation agency deems those to be CSS projects, then CSC may apply as well as CSM.

How is CSM Different? Cont'd.

- CSC is localized
 - Limited to Projects
- CSM applies on ALL DOT facilities

CSC tends to be project-specific. CSM principles can be manifested in actions that include Maintenance projects, routine maintenance (both in-house and contract) and actions taken at transportation agency facilities.



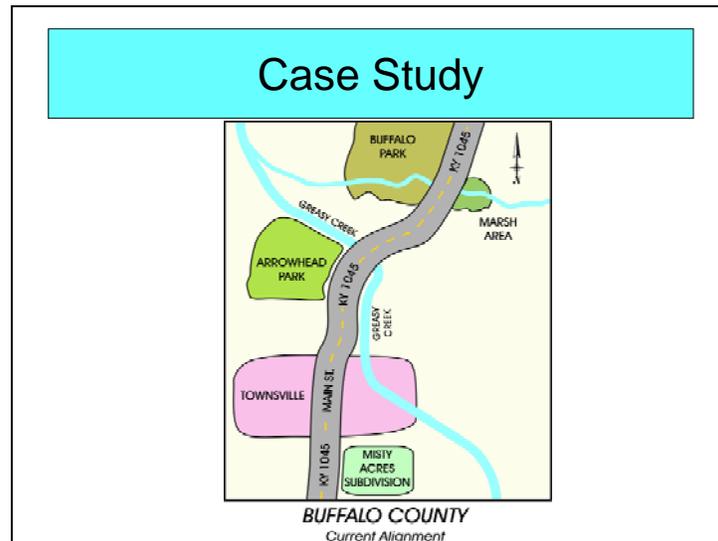
While some early principles associated with CSD are well developed (due to the initial focus on them by transportation agencies, other CSS-related practices have not received study or have not been developed sufficiently to allow their proper enactment in a structured well-defined manner. This is the purpose of this workshop. In some cases, the factors identified have not widely recognized and are presented for consideration and further development/ refinement.

CSS Principles

1. Use interdisciplinary teams
2. Involve all stakeholders
3. Seek broad-based public involvement
4. Use full range of communication methods
5. Achieve consensus on purpose and need
6. Utilize full range of design choices
7. Consider all alternatives and modes
8. Maintain environmental harmony
9. Consider community and social issues
10. Provide aesthetic treatments & enhancements
11. Provide a safe facility for users & community
12. Document project decisions
13. Track and meet all project commitments
14. Create a lasting value for the community
15. Use all resources effectively (time and budget)

Principles listed in **red** apply to CSS activities in CSC & CSM

This is the comprehensive list of CSS principles with those applicable to CSC and CSM indicated in red. This shows the significant applicability of CSC and CSM in fully implementing CSS on projects and completed facilities throughout their existence.



Townsville is the county seat of Buffalo County. A small city of 15,000, it was first settled in the 1820s. During the 1970s, it lost much of its industry, but throughout the 1980s and 90s its economy expanded and population grew. Much of the latter occurring in its suburban and rural communities.

KY 1045 runs the length of Buffalo County and through the center of Townsville. Along the way, it connects Townsville to its major suburb—Misty Acres Subdivision. The Kentucky Transportation Cabinet has decided that KY1045 needs to be upgraded to handle the rising traffic volume.

The project has been let. The Project Impact Profile and Special Notes detailing all the environmental commitments are attached.

Slide 1



This workshop was prepared by the Kentucky Transportation Center Context-Sensitive Solutions Team including: Don Hartman, Jerry Pigman and Ted Hopwood. It is intended to provide transportation agency personnel involved in Construction with information about Context-Sensitive Solutions (CSS) and actions they should take to incorporate it into their routine activities to supplement and support it. Those collective actions comprise Context-Sensitive Construction (CSC)

The background shows rehabilitation of an arch bridge on CO 83 in Castlewood Canyon State Park (2003).

Context Sensitive Issues

- The Natural Environment

- The Human Environment

- The Work Environment


When we think of the “environment”, we traditionally think of the natural environment (bugs & bunnies). Since the mid-1990s, there has been increasing focus on the human environment (buildings & bystanders) – the communities that are impacted by transportation projects. When we consider Construction and Maintenance, we must add an additional environmental concern-the project’s work environment (detours & drivers).

Primary Components of CSC

1. Special requirements for CSS projects
2. Construction input prior to contract awards
3. Project hand-offs from Design/PS&E
4. Regulatory compliance issues
5. Communications with stakeholders/public
6. Working with contractors
7. Final inspections & post-construction activities
8. Hand-offs to Maintenance

These are the primary components of Context Sensitive Construction. Some components may already be regular Construction duties/activities. The context-sensitive aspects of those should be considered and emphasized to ensure that the completed project is completed properly and that Construction activities conform to stakeholder/public expectations. These components also apply to projects that are developed by Maintenance with Construction oversight.



Common Construction Goals

- Project completion
 - On time
 - Within budget
 - Safely
 - In accordance with plans, special notes, specs., etc.
 - No change orders

Construction has several overarching goals for providing completed facilities. When Context Sensitive Construction is applied, these goals remain with several additional requirements.

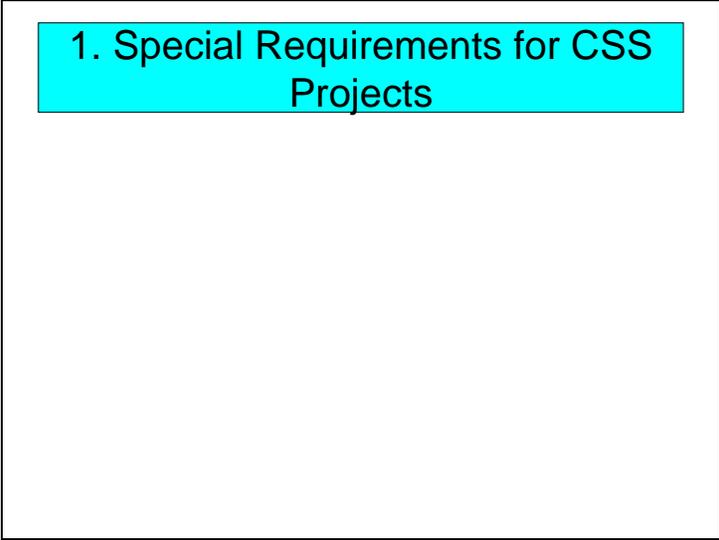


Additional CSC Goals

- Preservation of scenic, esthetic, historic, environmental, & community values
- Performing work
 - In an environmentally sound manner
 - With minimal disruption
- Honoring all project commitments

The additional CSC goals include preservation of communities and the natural environment. Preservation activities include the goal of minimizing disruption to communities, the environment and motorists during construction activities. Another key goal is to honor all project commitments made throughout the project development process.

The background picture shows work in progress on the US 40 (Berthoud Pass) reconstruction project in Arapahoe National Forrest, CO (2002)



1. Special Requirements for CSS
Projects

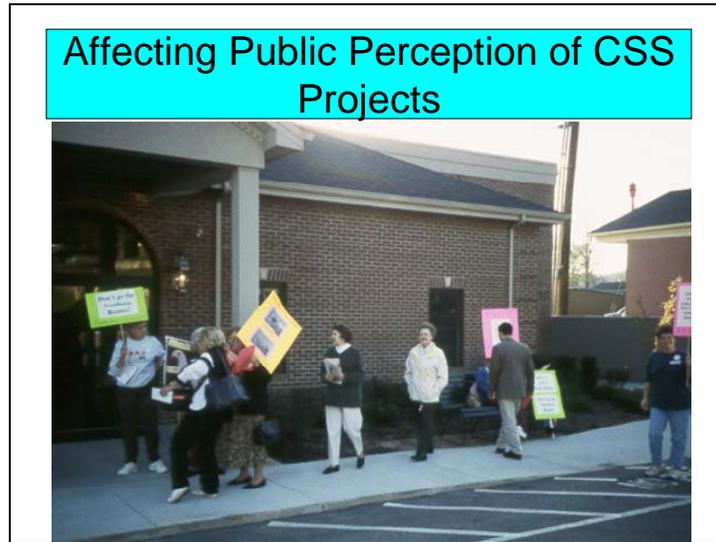
CSS projects have added goals that go beyond conventional or traditional transportation projects. To address those, CSS projects have special requirements that must be employed especially in Construction.

Special Requirements of CSS Projects

- Affecting public perception of CSS projects
- Project commitments
- Maintaining stakeholder/public satisfaction
- Contractors' roles
- Non-transportation/special features
- Minimizing disruption

This overview will address the specific differences between CSS projects and conventional ones. CSS projects have special requirements that must be addressed to ensure success of projects that have been developed in sensitive locations such as urban areas and pristine rural environments such as prime farmlands & national forests.

Slide 8



Prior to the use of CSS, many projects were opposed due to stakeholder/public opposition. That opposition has usually centered around concerns about the impacts of transportation projects on communities and the natural environment.

The picture shows an interest group protesting the construction of I 66 through the Daniel Boone National Forest in Kentucky (2001).



Stakeholder/public involvement in project decision making both in Planning and Design has led to projects that are compatible with communities and the natural environment (i.e. design excellence). This has promoted widespread satisfaction with the projects.



To accommodate stakeholder/public concerns, transportation agencies have had to revise the way that they design and build roads in the communities/ environment. This entails the use of flexible design which promotes use of the full range of options (geometric values) available to the designer in the AASHTO “Green Book”.

This picture shows US 68 (Paris Pike) in central Kentucky, the road that was designed to conform to the existing terrain and avoid historic elements including horse farms (2001).



The various transportation agencies have employed a variety of approaches to address environmental harmony.

This tree is situated in a local road in Bismark, ND (2003).

Affecting Public Perception of CSS Projects Cont'd.

- Public is less likely to oppose CSS projects
 - They want input during project development
 - They want specific project commitments

The public has welcomed the opportunity to participate in developing transportation projects (enabled under CSS). They want to have input to projects affecting their communities and environment. They want specific promises from the transportation agency developing a project.

The CSS Success Story

- Public opposition has decreased
- Previously failed projects has been completed
- Public satisfaction with projects/agencies have increased

One reason for implementing CSS was opposition to highway projects. DOTs were building roads, but generally ignoring or minimizing attention to community desires and some environmental impacts. Over time, the public and stakeholders became more adept at stopping or delaying transportation agency projects (e.g. Overton Park in TN and Paris Pike in KY). If the stakeholders/ public lost, they went away vowing to fight harder to block subsequent transportation projects. Transportation agencies usually did not pay much attention toward actions for public accommodation and, often, did the minimum necessary to be environmentally compliant.

As CSS is becoming more widely used by transportation agencies, the stakeholders/public are now aware that agencies will be more accommodating to their concerns.

In a recent (2006) survey of state transportation agencies, almost 90 percent of the respondents indicated that CSS was providing tangible benefits. Over half of those agencies indicated project development costs had not increased.

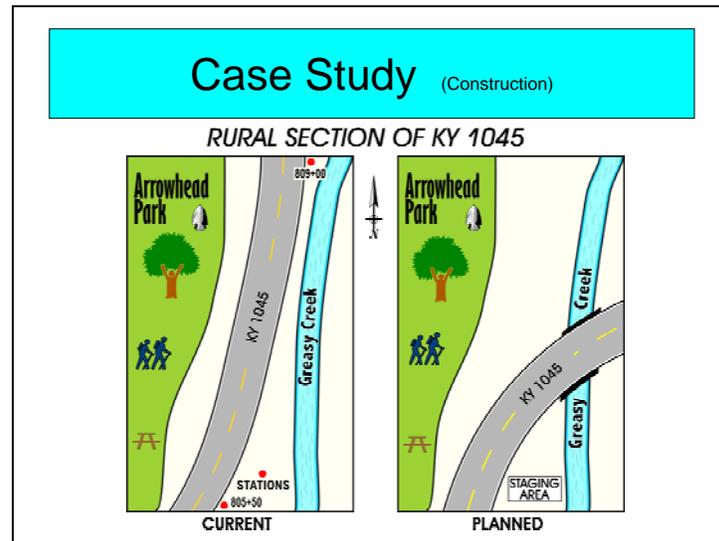


Stakeholder/public acceptance of CSS projects has resulted in their successful completion rather than litigation and associated delays. Public officials, stakeholders and the public welcome ribbon cutting ceremonies at successful CSS projects.

The New Reality

- The public/stakeholder focus is expanding
 - Scrutiny on how projects are being constructed
 - Interest in getting what the agency has promised
 - Concern about the long-term performance of CSS elements
- Construction & Maintenance have become important for CSS success!

The reality is that there is less opposition to new projects with more attention paid to getting what the stakeholders/public want from a project including: 1) CSS designs/features, 2) minimally invasive construction/maintenance, 3) agency sensitivity to environmental concerns and 4) durable, well-maintained CSS features. In the future, the stakeholders/public will not leave once a project goes to Construction (or Maintenance). They will be attentive to what is built and how it is built. Some stakeholders will also be concerned about how the context-sensitive features perform over time.



Case Study—Rural Section of KY 1045

The rural section of the road currently has two 10-foot lanes with 2-foot unpaved shoulders. After widening, the road will have two 12-foot lanes and 6-foot unpaved shoulders. At this location, the alignment must be altered so that KY 1045 crosses Greasy Creek using a bridge. The alignment runs within 100 yards of Arrowhead Park, an archeological site. After consultation with park officials, an agreement was reached to avoid staging on the park side of KY 1045 and the park archeologist had cleared the proposed alignment.

Construction has begun on the approach to Greasy Creek. Yesterday, crews preparing a staging area located between the creek and the new road discovered several Indian artifacts including arrowheads and some pottery shards. The staging area is in the right of way.

What actions should the contractor take?

What environmental issues must be addressed in performing this work?

Workers have been picking up the arrowheads. What are the consequences?

What public relations issues must be addressed before construction can resume?



A very important component of CSS projects are the commitments made by a transportation agency to project stakeholders/public. Those commitments shape agency actions throughout (and after) project development.

Types of Project Commitments

- Environmental commitments
- Other project commitments
- Implied commitments

There are a variety of project commitments. Some relate to environmental issues (both natural and human environment). Others are typical of commitments made on all projects to a variety of stakeholders such as local governments and landowners adjacent to a project. Additional commitments may be implied by past agency pronouncements, policies and practices on previous projects.

A photograph of a group of approximately 15 people, including men and women of various ages, standing in a room. They are dressed in business casual attire. In the foreground, the back of a person's head and shoulders is visible, suggesting they are looking at a presentation. Overlaid on the top of the image is a cyan rectangular box containing the title "Sources of Project Commitments" in black text.

Sources of Project Commitments

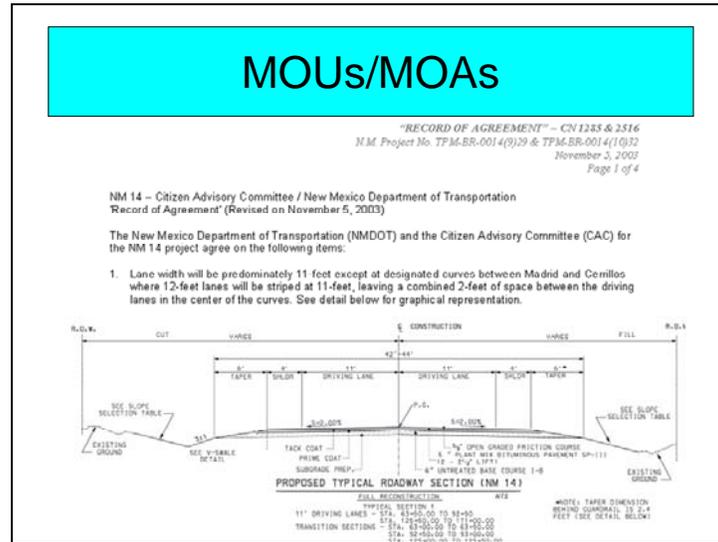
- Open meetings
 - Public, stakeholders
- Citizen's advisory committees
- Visits to impacted property owners
 - Homeowners, businesses
- Special meetings
 - Elected officials, businesses, etc.

Project commitments are made throughout the PD process by the transportation agency or its representatives. They can be made in many venues that involve agency contact with stakeholders/public. These contacts can range from formal group meetings to informal face-to-face discussions.

Sources of Environmental Commitments, Cont'd.

- FHWA NEPA process
 - Authorizations, RODs
- Resource agencies (e.g. DNRs, COE)
 - Permits, MOUs, etc.
- DOT policies
 - Commitment to implement CSS

Some commitments are derived from the NEPA process or other permitting actions involving resource agencies. Those are assumed by the transportation agency in order to facilitate or accomplish project development. They constitute legal obligations (to protect wildlife, ensure water quality, preserve historic culture, etc.). Agency policies also must be complied with by transportation personnel.



In some cases, a transportation agency enters into agreements with various stakeholders/public on what features and actions will be part of the project. These can be formal commitments containing written promises or even designs as in this MOU. They can be detailed in plans such as a roadway section template incorporated into an MOU.

This MOU was prepared by a citizen’s advisory committee and the New Mexico DOT (2003).

Why Those are Important

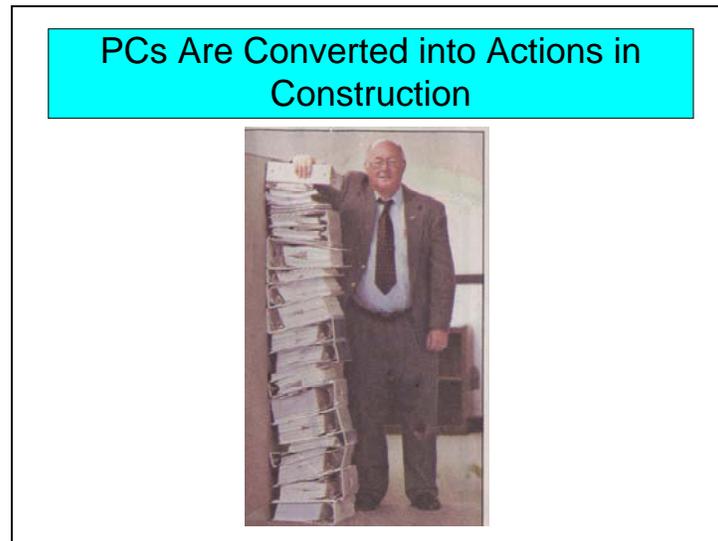
- They may be legal requirements
 - Federal
 - State
- They may be project-specific promises made by the DOT
- They may be DOT policies that apply to all (or CSS) projects
- They may be implied (e.g. “the DOT’s way of doing things”)

Some commitments may have legal implications. Some commitments are project specific. Others, typically policy related, apply to all projects. In some cases, commitments may be implied: “Build the road like it was in your own backyard”. All must be complied with for stakeholder/public satisfaction.

Why Those are Important Cont'd.

- Project commitments are fundamental to CSS
 - They reflect decisions made with stakeholder/public input
 - They drive the use of flexible design
 - They mitigate disruption
 - They create environmental harmony
 - Project commitment follow-through affects future projects

Complying with project commitments is a cornerstone of CSS. It is necessary to increase/maintain stakeholder/public faith in transportation agency's willingness to be truthful and forthright in its dealings and the follow through. Compliance with project commitments results in increased stakeholder/public support of current/ forthcoming projects and creates an atmosphere of mutual respect and trust.



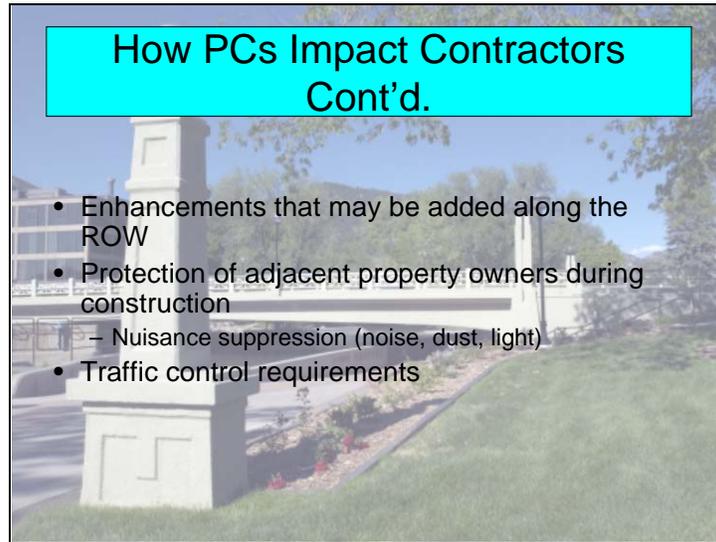
Compliance with project commitments adds complexity to projects. Many commitments, especially those arising from NEPA and environmental permitting may be extensive and require special awareness from transportation agency personnel/representatives involved with a project. This is especially true in Construction where the project commitments are turned into actions and eventually into transportation facilities.

This Kentucky Transportation Cabinet official is standing besides NEPA documents for a major Ohio River crossing near Louisville. These documents contain many project commitments.

How PCs Impact Contractors

- Actual work that is performed
 - How, when, where & what is built
- Existing features that are to be:
 - Taken
 - Moved
 - Avoided
 - Replaced

The contractor must build the project. Project commitments will have a significant effect on his actions during the project. They are as important as the plans that he will work to.



How PCs Impact Contractors Cont'd.

- Enhancements that may be added along the ROW
- Protection of adjacent property owners during construction
 - Nuisance suppression (noise, dust, light)
- Traffic control requirements

Project commitments bear on many attendant issues other than building roads and bridges.

Which all Translates into...

\$

And that means profits or losses if a contractor isn't aware of what PCs apply to a project and how they will affect the bid price

A contractor's ability to successfully complete a project and make a profit are related to his knowledge of and preparation for addressing project commitments. They may have a significant effect on his bid price.

DOT Tracking of PCs

- Throughout the PD process
- A gatekeeper for PCs
 - Project manager
- Recorded on computer
 - Access by DOT team members
- How are PCs to be captured after PS&E?

Project commitments may arise years before construction. They may be made in Planning, Design, or ROW prior to PS&E document preparation. They must be compiled in detailed form and provided to prospective contractors in order for the transportation agency to receive responsive bids. The best way to do this may be to have an individual such as the project manager responsible for compiling and tracking PCs (they may be revised as a project moves forward). A formal listing should be provided to agency personnel developing a project. A computer-based system such as the one used by the Kentucky Transportation Cabinet is ideal for this purpose. A major concern is how an agency tracks promises after the project is let.

How are Contractors Informed about PCs?

- Pre-bid meetings
 - Bidding documents
 - Specifications, special notes, plans, PCs list
 - Pre-construction meetings*
 - Follow-up meetings with District personnel*
- * May be too late for significant PCs

To get a responsive bid, contractors must know what they obligated to do prior to submitting a bid. This can be best achieved by a combination of pre-bid meetings and a listing of detailed project commitments in the PS&E documents. If the contractor is made aware of commitments in pre-construction or follow-up meetings, he may request a change order to accommodate those resulting in added costs to the transportation agency.

A Special Note on PCs

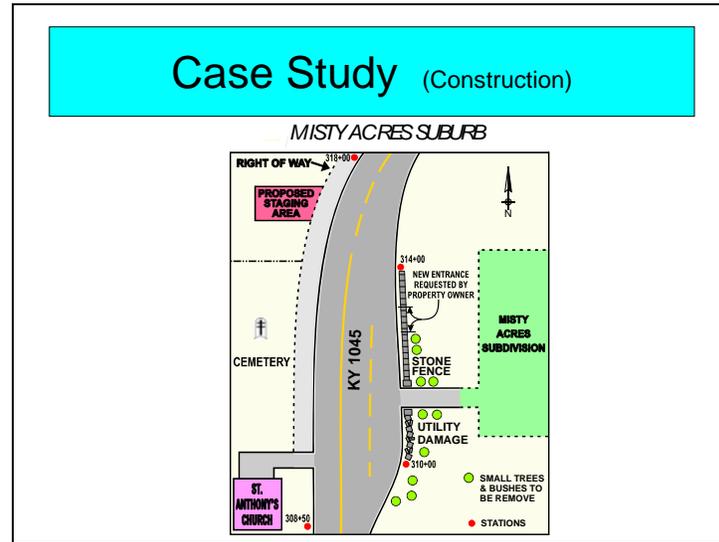
- PCs can arise in any phase of project development
 - Communications during construction
- PCs are subject to revision (consensus)
- PCs are subject to interpretation (**beware**)
- The contractor can make commitments
 - **Binding to DOT?**

PCs can arise in any phase of project development including construction. PCs are not written in stone. They are subject to re-negotiation and change if circumstances warrant. PCs can be subject to interpretation. Therefore, it is best to provide them in detail to prevent misunderstandings as to what was promised. The contractor may make promises on his own. This can cause problems if his follow-through does not meet the expectations of the parties he made them to. They may expect to have the transportation agency hold the contractor responsible or assume the responsibility for what the contractor promised.

Maintaining Stakeholder/Public Satisfaction

- When a project is let
 - Stakeholders/public have accepted DOT decision making
- A CSC goal is to maintain/enhance project acceptance
- This requires
 - Managing expectations (this is what I said, but this is what I meant)
 - Following through with PCs
 - Preventing controversy

Once the project is let, the transportation agency has the dual responsibility of seeing the project completed as it has specified and also providing stakeholder/public satisfaction with the project (including the compliance with all PCs). Another goal is to prevent undue controversy during the project. Controversy can include interpretation of PCs, PC follow-through, and NOV's from resource agencies.



Case Study—Townsville Suburb of Misty Acres

In recent years, much of the population growth has been in the suburbs south of Townsville. In this area, KY 1045 is to be widened to two 12-foot lanes. And it will have 6-foot reinforced grass shoulders. This will handle the growing volume of traffic and improve safety, as the current road has only two 10-foot lanes, with 2-foot shoulders on each side, bordered by drainage ditches.

A half-mile stretch of KY 1045 includes the entrance to Misty Acres Subdivision on one side of the road and on the other a historic church and cemetery. There are other historically significant properties close to the road and it is feared that taking part of them might harm the historic character of the area. While the subdivision itself is new, it has a stone fence at its entryway that was built in the nineteenth century. All of the properties along this stretch can be accessed only from KY 1045.

There is a farm next to the cemetery that has a stand of old growth trees, which have been designated a “Savannah remnant.” Several of these trees are also on the ROW. After the initial studies were completed, a change in ownership occurred with the same person now owning the properties on both sides of the highway including the farm. The new owner wants the contractor to cut a new entryway in the stone fence. In return, he is willing to let the contractor use land adjacent to his Savannah remnant tree stand as a staging area.

Prior to construction, the utility company damaged the south end of the stone fence and the community asks you, the contractor, to repair the wall, a costly and time-consuming task.

What project issues are present in this situation?

How would you respond to the owner’s request to cut an entrance in the stone fence?

If the owner asks the contractor to cut down the Savannah remnant trees on the owner's property can the contractor do it?

Can the state accept the arrangement for parking equipment next to the trees on the private property?

How should the contractor respond to the public's request to repair the stone fence? Should the transportation agency become involved with this request?

Contractor's Roles

- The contractor is vital to CSS success
 - Must provide a responsive bid
 - Should be informed of all factors impacting a project
 - prior to bid submittal
 - Must be aware of PCs
 - Including their intent
 - Must be conscientious
 - Should adhere to those like the project plans

Since the contractor is doing the work, he controls the actions that are necessary for CSS project success. He needs to be knowledgeable of transportation agency requirements/expectations and willing to carry them out in the spirit with which they were established.

Universal Unwritten Contractor Commitments

- When any contractor steps on to a project site, it is understood that they:
 - Are competent
 - Know how to execute project plans & specifications
 - Exercise common sense
 - Don't make snap decisions
 - Will make a “good faith” effort to complete the project as provided in the bid package

When a transportation agency enters into a contract with a construction firm, it is understood that the firm is competent. Competent in its engineering, the training of its workforce, and use of equipment in a productive manner that minimizes disturbance to a project's surroundings.



The US 62 bridge was erected in 2000. It is a new local landmark and one of the first examples of CSS in Kentucky. During the planning and design phases, efforts were made to site the bridge to avoid a historic farm house. During construction the contractor, who was unmindful of the significance of the farm house, bought the land on which the house was situated to store overburden. During that process, the house was destroyed and some stakeholders were angered at the Kentucky Transportation Cabinet for the contractor's action.

Non-transportation/Special Features

- PCs can address attendant features
 - Some in the ROW
 - Others not
- Some PCs address mitigation
 - Stream/wetlands mitigation
 - Relocation of historic elements
 - Reconstruction of existing features
- Others are new features
 - Stone facings on bridges
 - Decorative plantings

Some PCs will address features that are not directly related to the roadway. They can relate to specific environmental actions. Others may be new features such as planters, park facilities, or special treatments to roadway items (e.g. wooden guardrails).

Non-transportation/Special Features Cont'd.

- These features are of special importance
 - May be the reason for stakeholders/public project support
- These need to be overseen/inspected
 - As thoroughly as roadway components
 - Plantings
 - Appurtenances (sidewalks, shelters, trails)
 - CSS features on roadway facilities (stone facings on bridges)
 - Mitigation actions

Those features may be of as much (or more) importance to the stakeholders/ public as the transportation facility being constructed. They need to receive as much or more attention during construction.



This is a CSS project that incorporated planters, a brick sidewalk, shrubs and a bus turn-in located in an urban area. All of these special features are of importance to stakeholders/public.

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On this CSS project, a multi-use path has been added next to a new road. The trees and bushes along the path were also added as part of the project along with some special grading work in the green space to the right of the runner.

This is KY 234 - Cemetery Road in Bowling Green, KY (2003).



On some projects, historic buildings and houses must be moved and re-sited as part of the project requirements.



To accommodate new bridges, historic bridges may need to be dismantled. In some cases, they are reconstructed on private property.

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Dry stone walls may be moved and reconstructed.



Cuts or stabilized slopes may receive special treatment to make them match the environment. This specially treated retaining wall preserves a small cemetery adjacent to the roadway and blends with the adjacent cut.



Stone facings may be cast into bridge abutments and piers.

Slide 45



Sometimes how something is removed is as important as how something is built.



In cases where topsoil is removed for construction, it may be beneficially re-sited to other locations.

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Saving trees along ROWs is becoming a common activity on CSS projects.

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Wetlands mitigation may be another CSS requirement.

Minimal Disruption

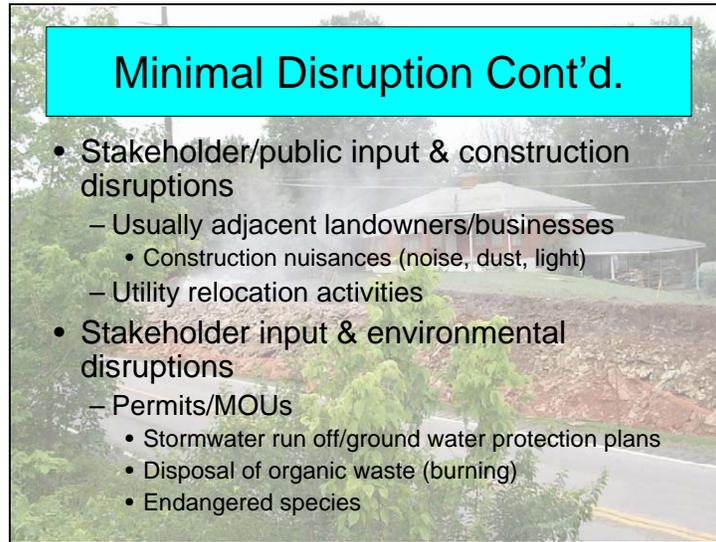
- Minimizing long-term disruption
 - Planning & Design objectives
 - Related to “what” is built
- Minimizing temporary disruption during construction
 - Affected parties
 - Motorists
 - Residents
 - Businesses
 - Communities
 - Environment
 - Some issues may not have been addressed prior to Construction

Planning and design phases of the PD process use CSS to avoid long-term disruption to communities and the natural environment using avoidance, minimization, mitigation and enhancement. Construction should attempt to minimize disruption due to construction activities. While temporary, that work can severely impact motorists, communities and the environment. Steps necessary to minimize construction disruption should be developed prior to the onset of work.

Minimal Disruption Cont'd.

- Construction disruptions
 - Related to traffic impacts
 - Related to construction activities
- Stakeholder/public input & traffic disruptions
 - Acceptable disruptions
 - May vary with communities
 - Unacceptable disruptions
 - Holidays
 - Special events
 - Peak traffic periods
- Traffic issues should be addressed in bid package
 - Provided by Contractor in pre-construction meeting

There are two disruptions during construction, those impacting motorists and those impacting the public and environment adjacent to the work. The public may provide input as to what disruptions are acceptable.



Minimal Disruption Cont'd.

- Stakeholder/public input & construction disruptions
 - Usually adjacent landowners/businesses
 - Construction nuisances (noise, dust, light)
 - Utility relocation activities
- Stakeholder input & environmental disruptions
 - Permits/MOUs
 - Stormwater run off/ground water protection plans
 - Disposal of organic waste (burning)
 - Endangered species

The common forms of construction disruptions involve contractor activities. However, utility relocations can also be problematic. Some construction impacts may be addressed by resource agency permits or MOUs.



In urban areas with daytime parking issues, night work may be necessary to prevent inconveniences to workers and shoppers. Addressing one disruption can create the potential for others. Steps may be required to suppress noise and lights from nighttime construction to minimize potential disruptions to area residents and businesses (e.g. restaurants and movie theaters).

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2. Construction Input Prior to Contract Awards

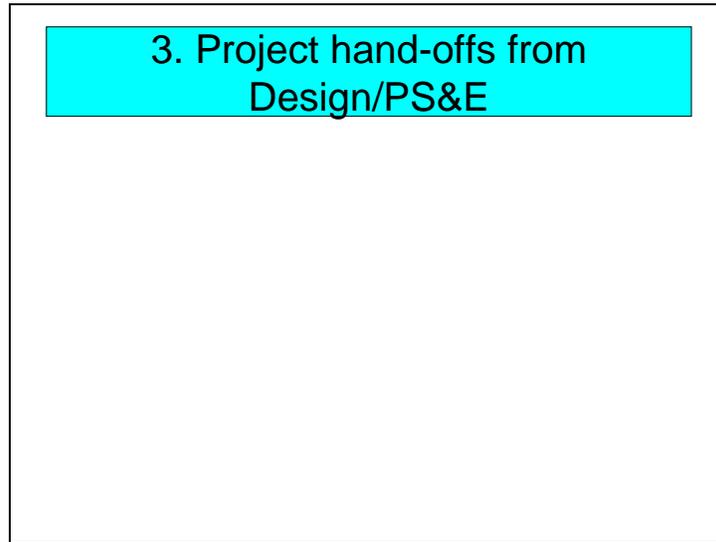
The next topic to be addressed is construction input about a project prior to awarding a contract.

Construction Input Prior to Contract Awards

- Objectives:
 - Incorporate Construction in the PD Team
 - As early as practical (before PS&E)
 - Construction needs to understand:
 - project context
 - intent of project & PCs
 - Allow Construction feedback
 - PCs
 - Design features
 - In-house value engineering and constructability reviews

It is desirable for Construction (and Maintenance) to have the opportunity to comment early in the project development process. Before PCs that require extensive construction activities are formalized, Construction input can provide the PD Team with cost-saving alternatives to what has been requested/ proposed. Early familiarization with a project will enable Construction personnel to learn of the project context , key stakeholder contacts and salient issues that will impact their efforts and those of the contractor. In-house value engineering and constructability reviews prior to PS&E will aid the transportation agency in obtaining the best approach to a project prior to preparation of the bid documents.

Intent of a project element or PC can be important. For example - *Are tree plantings intended to shield the road from houses or houses from the road?* Intent may impact a contractor's actions especially when PCs are listed, but not supplemented by design drawings or plan notes.



3. Project hand-offs from
Design/PS&E

The next CSS component involves project hand-offs from previous phases of project development to Construction.



Project Hand-offs from Design/PS&E

- Need a complete “bid package”
 - Accurate plans (with notes)
 - Environmental permits/MOUs
- ROW completed
- Utility relocation agreements
- Additionally for CSS Projects
 - All PCs (spelled out)
 - Last minute changes to PCs
- Advertisement for bids
 - Pre-bid questions from prospective bidders
- Hand-offs enhanced by pre-bid meetings

On CSS projects a comprehensive, complete bid package is a must. The plans need to be accurate and all PCs including environmental requirements need to be fully detailed. Prior to the letting, arrangements for utility relocations need to be completed. Utilities should be requested to conduct their work with care to avoid “hot button” issues such as removing cherished trees or otherwise disturbing areas to be preserved by PCs. Any last-minute changes to PCs should be fully developed. A pre-bid meeting should enable prospective contractors to fully understand the proposed project.

Pre-Bid Meetings

- Purpose of meeting
 - Inform contractors about project requirements
 - Identify beneficial revisions to contract documents
 - Get all participants on the “same page”
- Conducted before preparation of final contract documents
 - Special notes
 - Plans: such as traffic control
 - Project commitments

Pre-bid meetings give prospective bidders the best opportunity to fully comprehend what is required in the bid documents. It also gives the transportation agency the opportunity to learn about changes in the contract language that might provide a better document and the opportunity for an improved project. A pre-bid meeting should be conducted sufficiently prior to the advertisement for bids to allow for modifications to the contract documents and agency responses to bidder’s questions. Those responses can be posted on an agency web site to facilitate the information exchange process.

Pre-Bid Meetings Cont.

- Meeting participants
 - Project Team members may include consultants
 - Construction Team
 - District officials
 - Stakeholders
 - Prospective bidders
- Present draft bid package
 - Review all PCs
- Entertain questions/comments from contractors
 - Provide responses prior to bid submittal

When holding a pre-bid meeting, all relevant parties should be present including representatives of the Project Team (who can explain the background on key PCs), the Construction Team (who can be party to explanations of bid package requirements, District officials such as the environmental coordinator and public relations person, key stakeholders (to explain their specific requirements), and the prospective bidders. The draft bid package can be reviewed and questions/ comments solicited from the prospective bidders. It is beneficial to videotape these meetings and prepare transcripts of the questions from prospective bidders and the responses of agency officials.



Project Team for Construction

- District Construction personnel
- District DOT PR representative
- District environmental coordinator
- District engineer or project manager
- Consultants (if involved with inspection)
- *Once a project is let*
 - Add the Contractor to the team
 - Consider stakeholders to the team

The parties involved with the forthcoming field work should be assembled as a Construction Project Team. Once the project is let, it is beneficial to bring the contractor and key stakeholders into the Team and secure a common commitment to progress the project to completion. If consultants are involved with field inspections, they should also be members of the Team.

The background shows a Project Team for the CO DOT US 40 Berthoud Pass (2002).

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4. Regulatory Compliance Issues

The next primary CSS component addresses regulatory compliance issues.

Regulatory Compliance Issues

- Environmental documents = PCs
 - Project specific permits
 - Programmatic permits (BMPs, MOUs)
- Environmental requirements should be addressed in bid package
 - Should also address unanticipated “discoveries”
- Contractors may need specific training to address programmatic permits

As previously noted environmental documents (e.g. permits) are PCs. These need to be addressed in the bid package including actions required for unanticipated discoveries that may arise as the work progresses. The contractor’s personnel may need to have specific agency mandated training to address some environment-related activities.

**Regulatory Compliance Issues
Cont'd.**

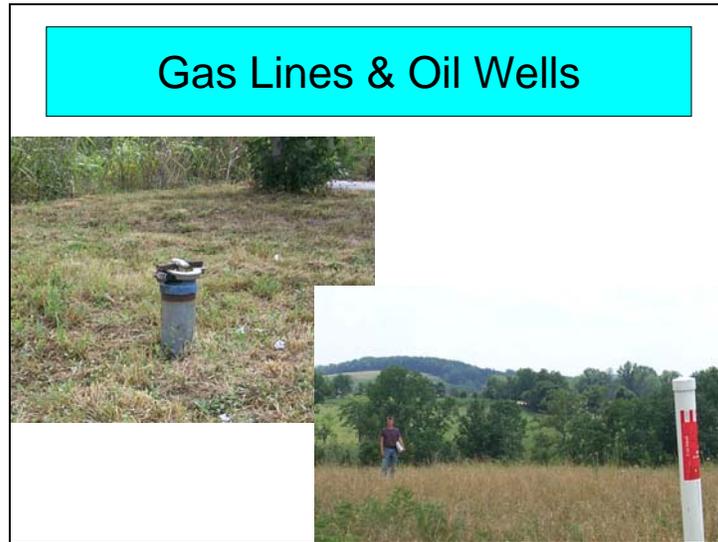
- **DOTs should be proactive in addressing environmental issues**
 - All DOT Construction personnel
 - All Contractor supervisors & workers
 - Subcontractors
- **Safety also reflects on DOT**
 - Public (including motorists)
 - DOT personnel at job site
 - Contractor's personnel
 - Subcontractors

The transportation agency must be “out front” in addressing environmental issues. On CSS projects, agency personnel may need special training/ instructions on addressing specific environmental issues including relations with locals impacted by construction. Similar training/instructions may be necessary for the contractor’s personnel.

Construction personnel should make sure that a contractor’s supervisors have the necessary training/information and that they have informed their workers of pertinent issues. Subcontractors also need to be alerted to CSS issues. Safety is also a key compliance issue impacting all who are driving/working at a jobsite.

Safety citations/accidents may be reported and arouse stakeholder/public concern about the conformance of contractor/agency work related to PCs.

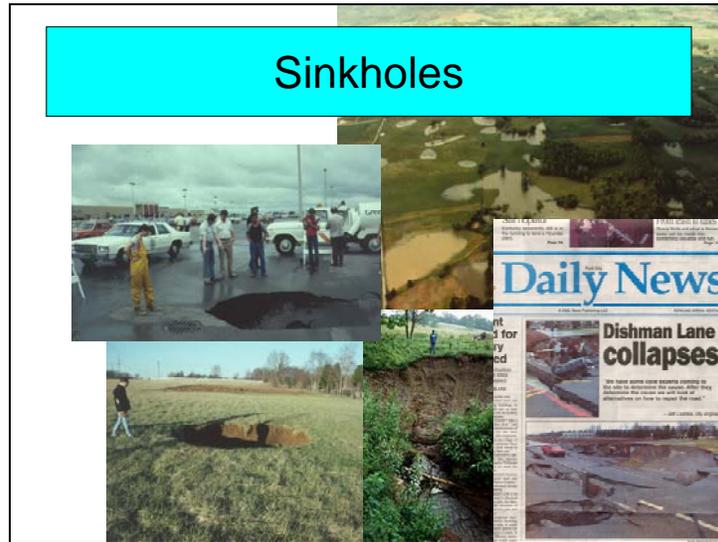
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Discoveries include oil well heads and gas lines.



Some converted gas stations with underground storage tanks may not have been detected prior to Construction. Those may prove problematic if the tanks have leaked fuel and contaminated the soil.



Sinkholes connect to the groundwater. Wastes should not be discarded into sinkholes nor should they be filled with concrete.



There are still many unknown burial grounds and other areas of significance to Native Americans. The culture of Native Americans must be respected and preserved wherever traces of it are found.



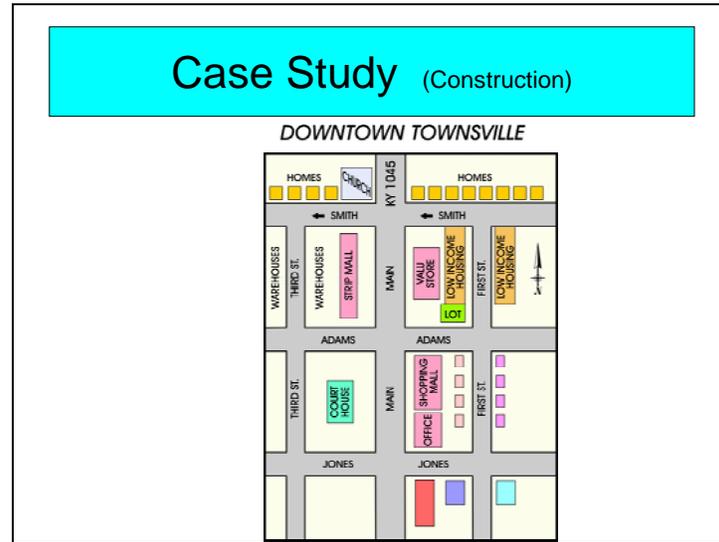
Occasionally endangered species or plants are unexpectedly encountered. When this happens, the work must stop and environment specialists consulted to identify actions that need to be taken.

This is running buffalo clover, an endangered plant, found in the Central U.S.



If a transportation agency is proactive and “up front” with resource agencies, they will be more accommodating of construction activities. If they think the agency is being deceptive, they will be less accommodating and more likely to “seek” problems. The transportation agency can determine which resource agency person they will deal with. Usually, they are the same person.

Pictures courtesy of Gregory Stumbo (Kentucky OSHA)



Case Study—Downtown Townsville

Townsville’s recent growth has led to an upsurge of traffic in KY 1045, which is called Main Street in the downtown area. To alleviate the congestion, the Cabinet intends to widen KY 1045 from two 12-foot lanes with two 8-foot paved shoulders to two 12-foot travel lanes with two 10-foot parking lanes and a 14-foot turn lane in the downtown section.

First Street runs through a low-income neighborhood with many children. On the corner of Adams and First, there is a vacant lot that the children use as a play area. Third Street runs through a warehouse area, which is often blocked by trucks entering and exiting the industrial loading docks during daytime working hours. The Cabinet has made a commitment to provide access to the warehouses during the day.

Along the Main Street section of KY 1045, there are businesses on both sides of the road that want to remain open during construction. Concerns about access were expressed at a public meeting. The merchants and many citizens want one lane kept open for traffic. (Customers would be allowed to enter the construction area to shop. And off-street parking would be available). This requirement was incorporated into the traffic control plan. With one lane open it is estimated that this phase of the work will take 5 weeks to complete.

The successful contractor has requested to shut down Main Street completely for one week to perform this phase of the work. He stated that this is in line with the Cabinet’s new policy to “get in, get out and stay out”. He used value engineering to show that a cost saving can be achieved by resorting to complete closure. He claims that there will be less community disruption with his total closure plan. Besides requiring the complete closure of Main Street, the contractor’s proposal would require a detour down First and/or Third Street.

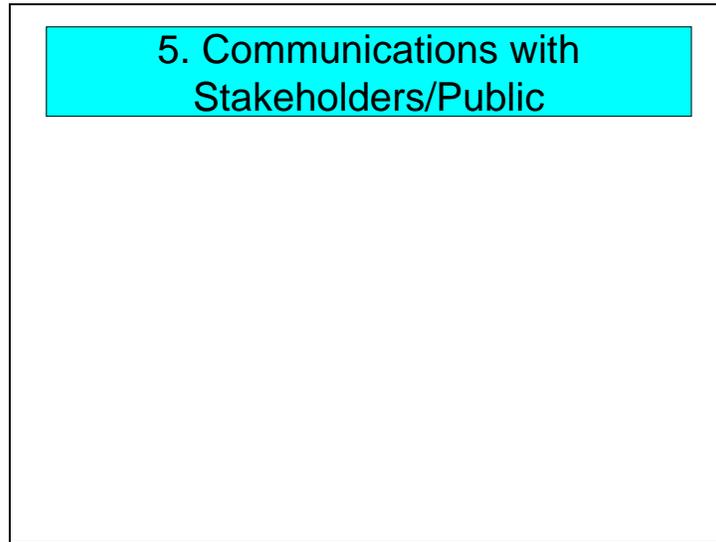
Is the contractor's alternative plan feasible?

What steps should be taken to handle the detoured traffic?

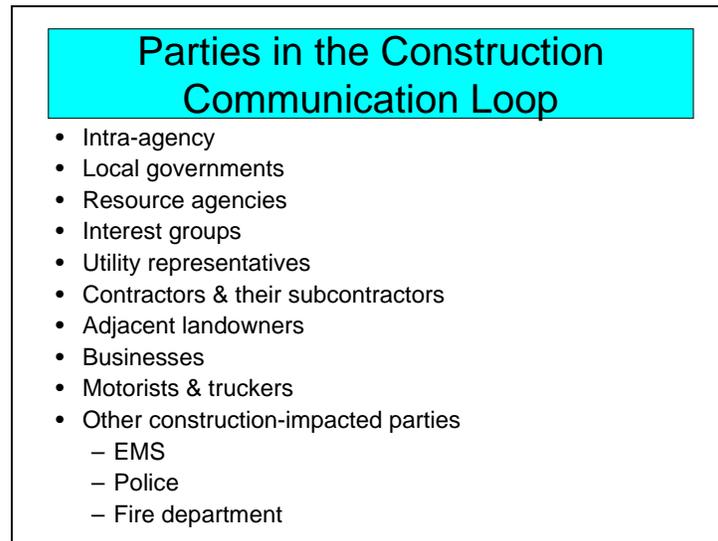
How and by whom are the citizens of Townsville to be informed of the proposed changes in traffic patterns?

If you were the contractor how would you build support in the community for the changes?

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The next primary CSS component addressed is communications with stakeholders/public.



There are a variety of parties that need to be kept in the communication loop regarding a project. When, where and how they will be communicated with will be determined by their roles in the community where a project is built and their previous involvement/interest in the project.



It is vital for Construction personnel to know the key stakeholders on a project. Obviously, local governments, businesses and adjacent landowners are involved, but other groups may also have great interest in the project. Some of them may have obtained PCs from the transportation agency. The Project Team should provide Construction with a list of relevant contacts and related PCs. Construction personnel should contact those parties prior to the onset of work to learn about their perspectives on the forthcoming work. Not every contact will be satisfied, but the agency's willingness to listen and maybe provide some accommodations may be instrumental in minimizing their concerns.

Communication Plans

- A communication plan is useful
 - Best prepared early in the PD process
- The plan is intended to:
 - Identify stakeholders
 - Determine communication tools
 - Each phase of a project
 - Perform timely communication
 - Stakeholders
 - Public
- If no communication plan exists prepare one for construction

A communication plan should be developed for each project. Key public meeting dates/locations should be recorded. This plan should also cover communication requirements extending into construction. The plan can be modified as project development proceeds. Construction personnel should prepare an internal plan for their phase of project development.

Communication Tools

- Face-to-face meetings
 - Local governments
 - Utilities
 - Resource agencies
 - Interest groups
 - Contractors & subcontractors
 - Adjacent landowners
- DOT Staffed offices

Face-to-face meetings are required for key parties in the construction phase. When a project is of sufficient size and complexity, a transportation agency may elect to establish a locally staffed office to facilitate communication about a project throughout its development into construction.

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Construction personnel need to hold face-to-face meetings with adjacent landowners along the project.

Communication Tools Cont'd.

- Public meetings
 - Preliminary contacts
 - Interested/impacted parties
 - Businesses
 - Adjacent landowners
 - Planned work/scheduling
 - Obtain stakeholder feedback

Public meetings can be used by Construction to provide stakeholders/public with opportunities to discuss the schedule and progress of work and handle any concerns that arise.

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Public meetings on scheduled work may be desirable if significant impacts are anticipated with a community.

Communication Tools Cont'd.

- Mailings, fliers & door hangers
 - Notices of forthcoming work/interruptions
 - Interested/impacted parties
 - Businesses
 - Adjacent landowners
 - Public likely to use road
 - Insures that impacted parties are notified

A less personal approach for informing the public is to use mailings and other one-way forms of communication. This is a means of at least insuring that the public has received information about construction activities.

Gateway to Princeton Team Members

- Kentucky Transportation Cabinet**
 Director, Director
 Bill Miller, Chief of Staff
 P. C. Chaffin, EIRMA Coordinator
 P. R. Brown, Materials Engineer
 Bruce Adams, Resident Engineer
 Transportation, EIRMA Group
 David Carter, EIRMA
 Mark Allen, EIRMA
 Charles Jones, Resident
 Jack Williams, Resident
 Frank Jones, Resident
 Melissa Hinkle, Right of Way
 Mark Hinkle
 Sarah L. Lewis, Inspection
- A. H. Stone, Inc.**
 David Clark, V.P. Estimator
 David West, Project Management
 Gerald Adams, Estimator
- Kyler Bridge Company, Inc.**
 David R. Coe, President
 Ronald Kyles, Supt.
- Triple D Communications**
- Holtek Electric Company**
 Gordon Miller, Vice President
- Hayden Brothers Contracting, Inc.**
 John C. Hayden, President
 Kevin Adams, Project Engineer
 Bob Adams, Vice President
 Tracy Young, Project Manager
 Eric Jackson, Foreman
 Luther Gilley, Supt.
- Lane Companies, Inc.**
 Tim Spivey, Resident Engineer
- Beckwith Building Company**
 Stan Wilho, President
 Frank Coon, Foreman
- P. L. Railway**
 Effie Buchanan, Chief Engineer
 Van Knight, Chief
 Oscar Moore, Road Foreman
- Colwell County Fiscal Court**
 Van Knight, Chief
 Oscar Moore, Road Foreman
- Princeton Police Department**
 L. B. Robinson, Chief
 Brian Ward, Patrolman
- Princeton Utility Plant Board**
 Randy Daniels, Chief Clerk
- Rogers Group, Inc.**
 Gary Johnson, Chief
 Steve Adams, Supt.
 Bob Adkins, Supt.
 Jeff Ellis, Supt. Supt.
 Eric Jackson, Foreman
 Howard Hart, City Clerk
- Princeton Water/Wastewater**
 Virginia Roberts, Supt.
 Jeff Anderson, Maint.
- Wessons KY Co.**
 Jack Blackburn, Supt.
- Jack Williams Contracting**
 Jack Williams, Contractor
- Charbon Bridge Company**
 Steve Rice

REIDON BROTHERS CONTRACTING, INC.



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 Springfield, Kentucky 40069
 Phone 606-338-6000

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 207 Kirtland Road
 Princeton, KY 42447
 Phone 606-276-2441 ext. 2100

With dedication, giving opportunities for higher earnings, the team completed the original project and paving completion since 2002. The site was kept and their site Stewart inside in Colwell County.

An Open House sponsored by the Gateway to Princeton Team was given on November 15, 2000. The estimated 150 persons attending were served hamburgers, hot dogs and chicken breast sandwiches cooked by John C. Hayden, president of Hayden Brothers Contracting, Inc.



Kyler Bridge Company, Inc.





Kyler Bridge Company, Inc. is a Colwell, Kentucky based company specializing in the construction and design of bridges in Kentucky. The company was formed 40 years ago in 1961, by David Kyle, president. The majority of their work consist of bridge construction primarily for the Kentucky Transportation Cabinet. Kyler Bridge Company, Inc. is recognized through various Kentucky state award for construction.

Kyler Bridge Company, Inc. is the bridge and concrete sub-contractor on the SR 100, SR 62, SR 100 projects.



Partnership Goals

- No lost time injuries or accidents.
- No traffic accidents due to construction operation.
- Public inconvenience to be held to a minimum.
- Keep the spirit of Partnership alive.
- Complete project before the announced completion date.
- Financial success for all parties.
- No unplanned utility outages.
- Maximum incentive pays for riskability.
- Have a quality project that will be used as a standard of excellence for future projects.
- Maintain good public relations.
- Create, maintain and complete a project we can take pride in.

Partnership Mission Statement

We, the Gateway to Princeton Team, support the KY 61 - SR 62 Improvement Plan, and effective manner with a minimum inconvenience to the public. The project is completed through honest, hard, good communication, commitment, and responsible actions to the community statement.

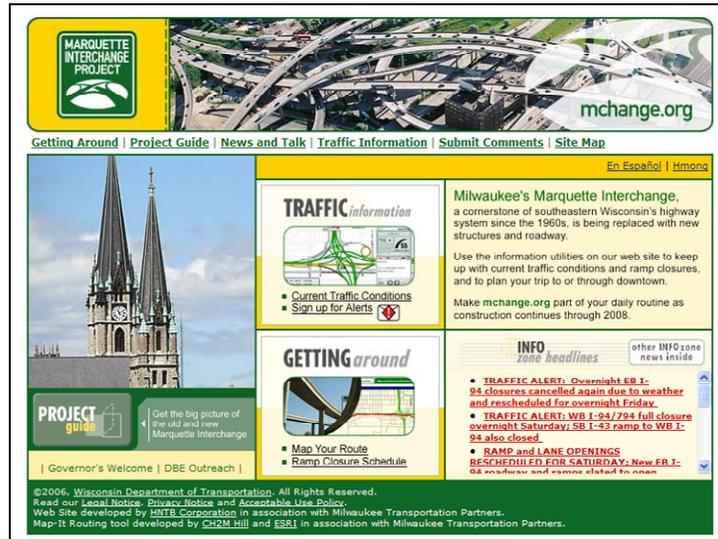
Mailings can include pamphlets that inform the recipients about the start of work and how it will affect them. As noted in the pamphlet this construction project team held an “open house” adjacent to the construction site and provided for a cookout to help build a community partnership with the project.

Communication Tools Cont'd.

- Mass media (including web sites)
 - Notices of forthcoming work/interruptions
 - General public

Mass media (newspaper, radio and TV) is being widely used to keep the public apprised about the impacts of a roadway construction project. Internet web sites are now being used for the same purpose on large projects.

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Internet web sites can be dedicated to a specific project with major community/motorist impacts.

This is a Wisconsin DOT website on construction of the Marquette Interchange, a large project in downtown Milwaukee (2006).

Communication Tools Cont'd.

- Indirect personal contact (telephone calls, e-mails)
 - Hotlines for complaints/concerns
 - General public/impacted parties

Telephone contacts are useful where face-to-face meetings prove impractical. Telephone hotlines can also be useful for obtaining and providing information in a timely manner.

Communication Tools Cont'd.

- Letters
 - Formal communications
 - Where records of communications are necessary

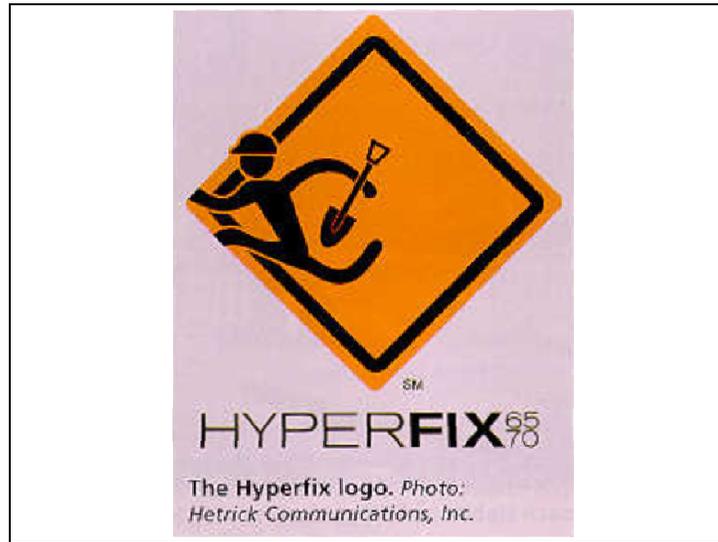
Some project information and decisions should be provided in formal written communications to stakeholders. This is useful for stating an agency position and provides a record of the communication.

Communication Tools Cont'd.

- Signs/variable message boards
 - Along construction projects
 - Inform motorists about traffic impacts/work

Signs are needed for safety and to alert motorists to changing conditions. Variable (changeable) message signs can be used for detours or alerting motorist to potential delays.

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Special logos can be developed for major projects. Those can be used to alert the public that information contained along with the logo relates to a specific project. This logo was developed for a major construction project on I 65 & I 70 in downtown Indianapolis.

Communication & Project Coordination

- Proper coordination of work
 - Vital aspect of construction
- Communication about project activities
 - Local governments
 - Public agencies
 - Stakeholders/public
- On CSS projects more parties “kept in the loop”
 - Focus on both road work & PCs
 - Communication coordination between Construction & contractor

Communication is vital for coordinating many aspects of a project including community actions to accommodate it. Communication between Construction and the contractor is necessary for coordinating their respective activities. Stakeholders/public may be concerned with CSS activities and want to be kept informed about construction activities. This may require frequent communication/coordination between Construction and the contractor.



Sometimes, the public needs to be informed about transportation agency actions or features being constructed. When US 150 was reconstructed in Perryville, KY, the public was told that the new road would resemble older roads. To provide enhanced aesthetics, weathering steel guardrails were installed. The public was not informed of this feature and assumed that as part of the “old road” look, rusty “old” guardrails were installed. This misconception persisted several years after the road was reconstructed. The public should have been informed about the guardrail treatment prior to installation.

This is US 150 near Perryville, KY (2002).

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On the same project, the height of US 150 was to be lowered in relation to adjacent property where the road approached Perryville from the West.



When a rendering was prepared, several of the stakeholders objected to the extent of the height reduction planned for the road. It was subsequently raised in the final design. To maintain sight distance over the crest of a hill, the road was elevated slightly from the crest of the hill westward.



The local American Legion Post had been informed that the road would be at the same elevation at their location as before the new construction. Due to the haste in constructing the project (to meet a scheduled Civil War battle re-enactment), Kentucky Transportation Cabinet officials overlooked informing the Post of the last minute road profile change and they did not learn about it until construction was taking place. They were upset with the location of their building (in a depression) relative to the new road. They subsequently wanted to put a wrought iron railing in front of their Post. An agency official initially told them that this could not be constructed as it would pose a safety hazard. However, the fence is now in place.

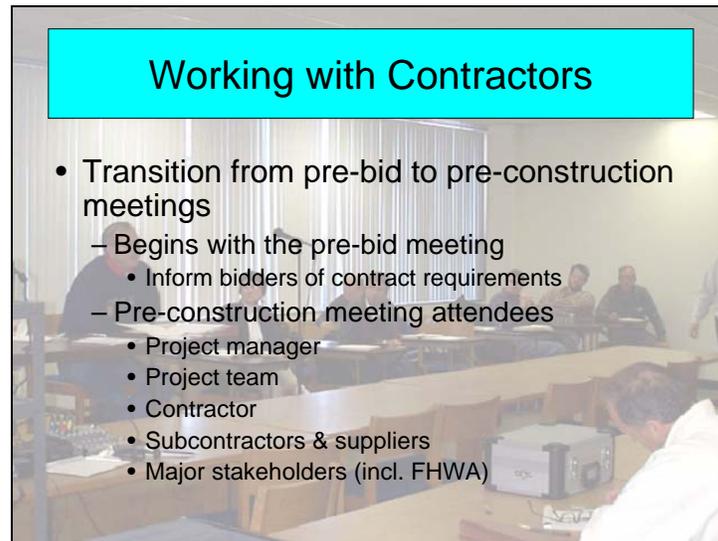
Discuss both issues: change in roadway profile and the fence.

How does this reflect on the agency?

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6. Working with Contractors

The next CSS component to be discussed is working with contractors.



Working with Contractors

- Transition from pre-bid to pre-construction meetings
 - Begins with the pre-bid meeting
 - Inform bidders of contract requirements
 - Pre-construction meeting attendees
 - Project manager
 - Project team
 - Contractor
 - Subcontractors & suppliers
 - Major stakeholders (incl. FHWA)

The first contact with the eventual contractor is at the pre-bid meeting. The level of detail discussed at that meeting were sufficient to obtain a responsive bid. The pre-construction meeting will provide the attendees with even more information necessary to proceed with the contract and productive work on the project.

Pre-construction Meeting

- Contractor's information
 - Contractor's work plan & schedule
 - Phasing, traffic, environmental & communication plans
 - Type of equipment
 - Work schedule
 - Determine how he will address PCs
 - PC action plan
 - Specific questions about each PC
 - DOT should have these **before** work begins

The contractor is required to provide the transportation agency with specific information. That information should have been specified in the bid package. For CSS projects, the contractor should specify how he will address all PCs. This may be a stated requirement in the bid package. Construction should require this information prior to allowing work to proceed.

Pre-construction Meeting Cont'd.

- The contractor should orient his personnel & subcontractors about PCs
 - Human: noise, dust, vibrations, safety, etc.
 - Natural: plants, animals, water, soil, etc.
 - Other: business, civic activities, schools, etc.
- That activity should be addressed in the pre-construction meeting
- Contractor's personnel training must be identified

The contractor should state how he will inform any subcontractors not at the meeting about PCs that they could affect. If special training for the contractor's personnel is necessary, it should be identified/scheduled at the pre-construction meeting.

Pre-construction Meeting Cont'd.

- The contractor may elect to apply value engineering
- Construction/Design must review
 - Acceptability to DOT
 - Conformance with PCs
 - Stakeholder(s) for specific PCs should review proposed change(s)

If the contractor uses value engineering, his proposal must be reviewed in terms of its affect(s) on PCs. If those must be changed, Construction must specify what actions are necessary for stakeholder/public approval.

Pre-construction Meeting Cont'd.

- Large/complex CSS projects
 - Propose formal partnering
 - Monthly progress meetings (at least)
- Small/simple CSS projects
 - Propose informal partnering
 - Weekly progress meetings

Partnering/teaming efforts should be recommended to the contractor. Formal partnering is desirable for larger, more complex projects with long durations. Informal partnering (periodic meetings) is recommended for smaller/simpler/shorter CSS projects. Partnering/teaming enables the periodic review of progress, forthcoming schedules/activities, and concerns of the various parties involved with the project.

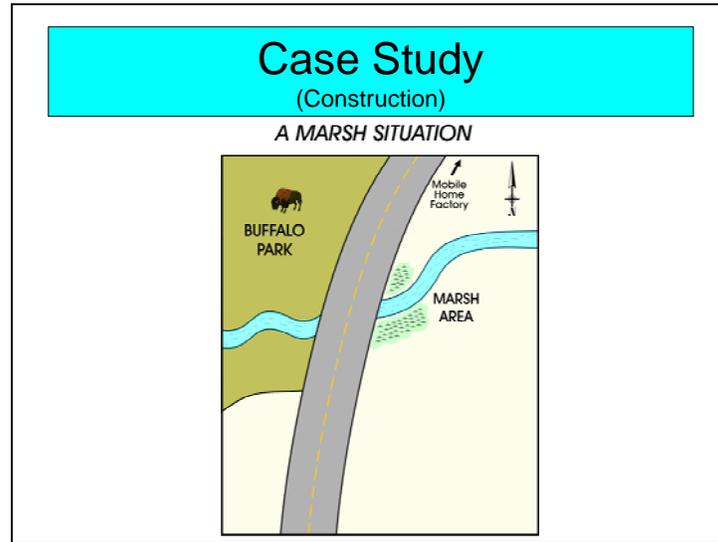
Promote Contractor Interaction with Stakeholders

- Encourage formal partnering between contractors & key stakeholders
- Provide training (CSC Workshop)
- Encourage contractor communication with all stakeholders
 - Work with DOT district PR officials

The contractor should be encouraged to have contact with project stakeholders. This promotes involvement/interest by the contractor with community and environmental interests. District PR personnel can assist with this interaction.



Contractor interaction with stakeholders/public should begin prior to the onset of work with informal meetings such as community cookouts and continue throughout the project with tours for key stakeholders.



A Marsh Situation

KY 1045 runs along the east border of Buffalo Park two miles from downtown Townsville. It crosses a small stream that flows into the park. During widening, it will be necessary to replace the present culvert with a new one.

The original plan was to maintain traffic with partial-width construction. However, that has been rendered impractical due to the presence of oversize trucks transporting shipments to and from the new Country Comforts Mobile Home plant, which is now the largest employer in Buffalo County. The construction area is two miles south of the new plant and this road is its only usable route. During construction, it is expected that at least 30 oversize trucks will be towing doublewide trailers through the construction area.

The contractor desires to build a short detour at the site. But he confronts a dilemma. Buffalo Park is protected by 4f regulations, which prohibit permanent acquisitions of land from a park or historic area. On the other side of the culvert area, there is a small 5-acre marsh. An inspector on the project says that the marsh was created during the previous road construction when the stream was diverted.

Should the contractor propose closing the road for two weeks to complete the work?

Should the contractor run the detour through the marsh or the park? Justify your answer.

Who should the contractor consult in order to obtain guidance?

Identify all public relations issues?

Contractor at the Job Site

- Oversee work like conventional project
- Review contractor's compliance with PCs
- Provide necessary communication & coordination with stakeholders/public
 - Based upon contractor input
 - Work schedule/disruptions
 - Follow-thru on PCs

CSC project management during construction is similar to conventional projects. However, continuing review of the contractor's compliance with PCs is needed. Construction personnel should be in regular periodic contact with stakeholders/public to ensure they are aware of the progress of the work and future work scheduling. Much of that information must be provided by the contractor.



Construction activities impact the human and natural environment. It also impacts motorists in work zones.



The contractor must perform specific activities to ensure that a project minimizes disruption with communities and the natural environment and with motorists.



Special Construction Issues

Sometimes unusual circumstances are encountered that impact construction.



Construction activities should conform to environmental regulations. Working in waterways is usually prohibited.



Before a contractor leaves the work site, all discarded items should be removed.



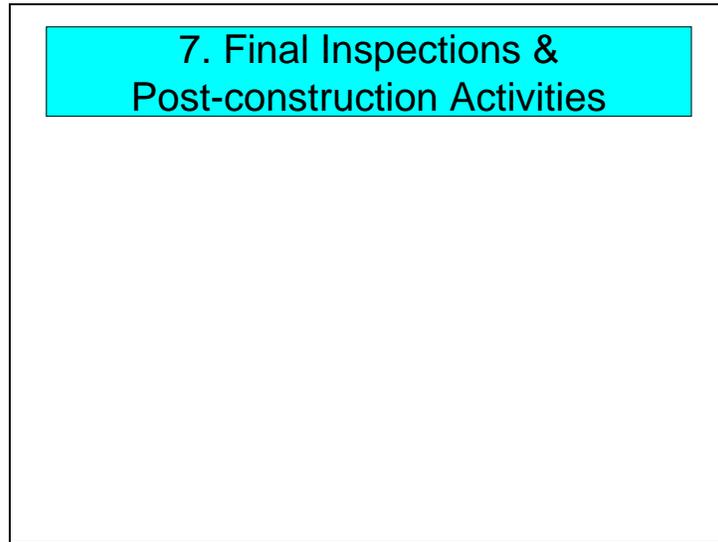
The contractor should prevent/clean-up oil spills at equipment storage and repair areas before he leaves the job site.

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The contractor should prevent storm water run off from overburden into waterways.

Slide 108



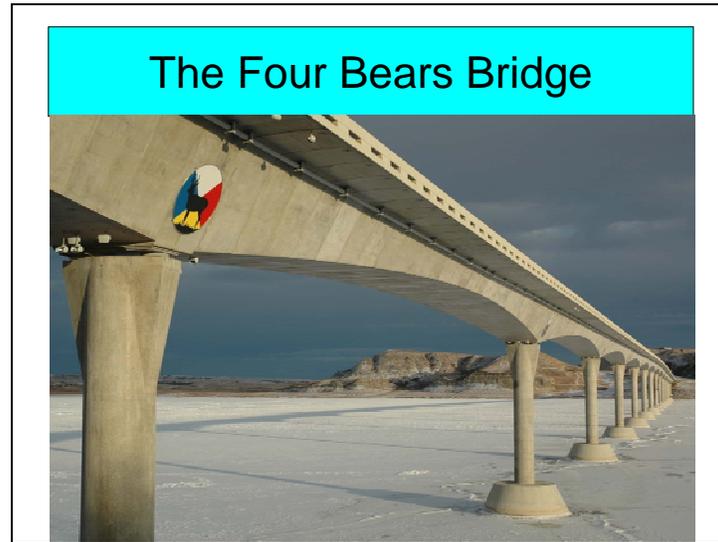
**7. Final Inspections &
Post-construction Activities**

The next CSS component we will discuss is final inspections & post-construction activities.

Final Inspections

- Project final inspections
 - Include CSS features/amenities (PCs)
- Some CSS items may be under warranty
 - Plantings
 - Make sure they are living
 - Make sure they are properly planted
- Post-construction punch lists
 - Provide all CSC features prior to final acceptance of project & payment

Final inspections should include CSS items. Where warranties are provided for plantings, the condition of the plants should be determined including whether they were properly planted. Post-construction punch lists should include any CSS items that need to be completed/repared. That work should be affected prior to final contractor payment. The work should be completed in a timely manner.



This is the Four Bears Bridge over Lake Sakakawea on the Fort Berthoud Indian reservation in North Dakota (2005). The bridge was developed by the ND DOT as a CSS project incorporating several culturally based aesthetic treatments identified and provided by the three affiliated Indian Tribes in the reservation--the Hidatsa, the Mandan and the Arikara. The project was well received by the tribes who consider it a symbol of their culture. It is a national award winning bridge.

Picture provided by Michael Kopp of the North Dakota DOT.

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Tribe symbols were placed along barrier walls.

Picture provided by Michael Kopp of the North Dakota DOT.

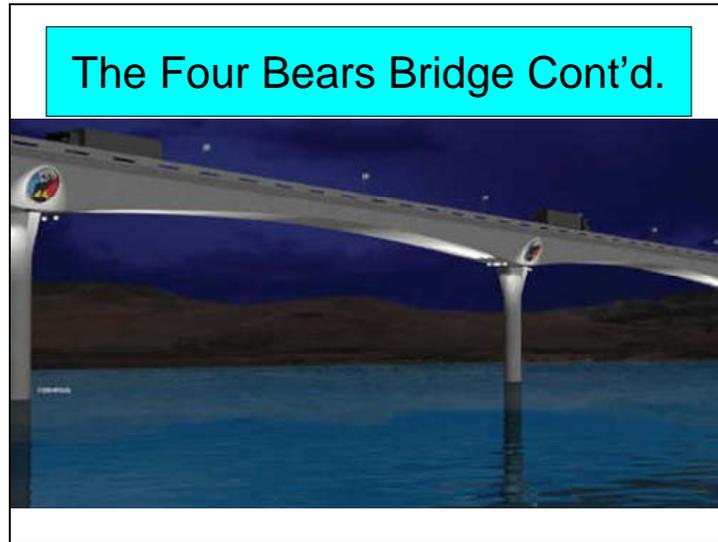
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Other tribal patterns were used on the bridge walkway.

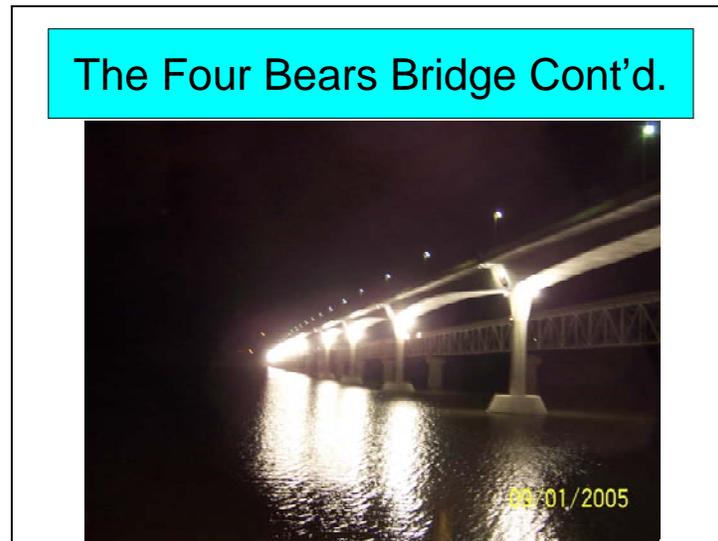
Picture provided by Michael Kopp of the North Dakota DOT.

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Special lighting effects were designed to highlight the bridge and Native American symbols were placed along the superstructure.

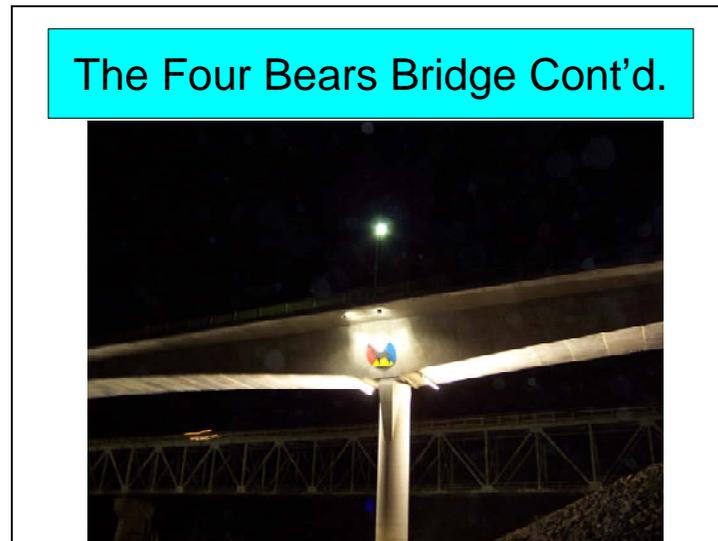
Picture provided by Michael Kopp of the North Dakota DOT.



However, problems with excessive lighting were encountered shortly after the bridge was opened. The excess lighting provided (as designed) was due to the lower than expected background light in the rural area surrounding the bridge. The design specification was more appropriate for an urban setting with much higher ambient light levels.

Picture provided by Michael Kopp of the North Dakota DOT.

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The problem was simply resolved by removing some lights.

Picture provided by Michael Kopp of the North Dakota DOT.

Post-construction Meeting

- **Meeting attendees**
 - DOT construction team & project personnel
 - Contractor
 - Management consultant (if used)
- **Items for review**
 - Value engineering changes
 - Change orders
 - Disputes/claims & negotiation/settlements
 - Adherence to schedule
 - Follow-through on PCs
 - Suitability of the contract documents
 - Partnering relationships
 - Performance of DOT/contractor personnel

A post-construction meeting is useful for reviewing project progress and identifying any problems that might have occurred. It should provide guidance to both the transportation agency and the contractor about each other's performance and should provide the basis for improvement on future projects.

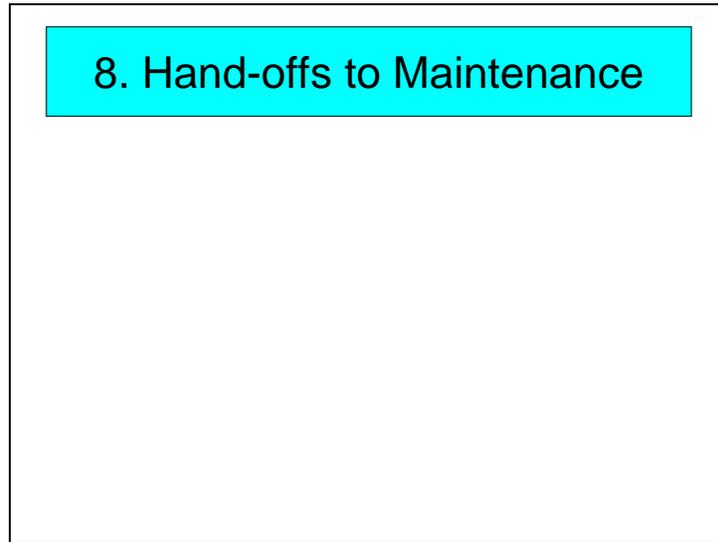
CSC Audits

- Conduct project CSC audit
 - Post-completion (2-6 months)
- Field review performance of CSS features/amenities
- Survey project stakeholders/public
 - Opinions about DOT follow-up on PCs
 - Ratings of DOT/contractor performance
- Develop “lessons learned”
 - From post-construction meeting & audit
 - Incorporate in continuous improvement program

Several months after a project is completed, Construction should audit the project to determine the performance of CSS features/amenities. Any problems with those should be identified and promptly resolved. The audit should be extended to contacts with stakeholders/public including all adjacent property owners. The findings should be compiled into a report including lessons learned and implementation plans made for addressing those on future CSS projects.

Auditing Form	
Project Commitment Stakeholder Report Card Form	
Date Compiled: 12-13-04 Compiled by:	
Project Title/Location: KY 234 – Cemetery Road (Warren County)	
Project No.: Multiple Projects including FD52 114 0234 010-012	
District: 3	
1. Stakeholder (Agency/Individual):	
Stakeholder name:	
Nature of project involvement: Involvement in various facets of design	
2. Provide letter grade (A, B, C, D, F) for overall project as implemented:	Grade: A
Reason: <i>KYTC Dist 3 extremely willing to work with local government on the unique problems posed by this project.</i>	
3. Provide letter grade (s) for the scope project commitments that impacted you/your agency	
Commitment accommodates multi-modal use.	Grade: B
Reason: <i>The Greenways Committee sought more separation of the shared use path from the roadway.</i>	
Commitment landscape buffering	Grade: A
Reason: <i>KYTC was willing to implement an extensive land use plan.</i>	
Commitment KYTC implementation of access control along a portion of Cemetery Road.	Grade: A

This is a simple “report card” auditing form used by Kentucky Transportation Center researchers for obtaining stakeholder/public input on completed projects. The form used a simple A-F grading system enabling consistent input from stakeholders/public.



8. Hand-offs to Maintenance

The final CSS component addresses hand-offs from Construction to Maintenance.



Hand-offs to Maintenance

- List of PCs
 - Including on-going requirements from DOT environmental division
 - Special interaction requirements
- Acceptance records for project work
- Any warranties still in effect
- Results of the CSC audits
- Unresolved “hot button” issues

Construction should provide Maintenance with a list of PCs including on-going agency requirements. Other information can include existing warranties, results of CSC audits and any unresolved issues with stakeholders/public that may be of concern.

CSC/CSM Actions to Promote Sustainability

- Arrange for reusing/recycling demolition materials
 - Old bridge beams/rebar
 - Pavement
 - Organic wastes (trees, bushes)
 - Preserve top soil
- Limit/eliminate use of hazardous materials by contractors

Construction and Maintenance can support sustainability goals by promoting the reuse/recycling of demolition materials from old bridges and roads. Used prestressed and steel beams can be stored and re-used or given to local governments. Scrap paving materials can be saved and recycled in new pavements or base material. Organic wastes can be ground for mulch or placed in locations where erosion is occurring to limit soil erosion.

Construction and Maintenance can institute programs to limit/eliminate wasting of materials generated on projects. Of special emphasis should be limiting/eliminating contractor use of hazardous materials that must be subsequently disposed of as hazardous wastes. Solvent/spent oil recycling is one potential initiative.



Recycling of demolition materials may require temporary storage at transportation agency facilities until opportunities for re-use/recycling arise.

Closure

- Construction & Maintenance have a vital role on CSS projects
- They should be involved with the PD process prior to their phase of activity
- PCs project follow-through should continue into Maintenance
- Project commitments are the key to success
 - Good communications comes in second

Construction and Maintenance have vital roles in CSS. They need to be involved with projects before PS & E. Key to a successful project/facility is the knowledge of the project-specific PCs and any other agency commitments that constitute PCs. Construction and Maintenance are responsible for meeting PCs at the end of project development and ensuring that they are complied with over the life of a facility.

A second key factor is to maintain good (open, periodic, and two-way) communications with all parties involved with projects including contractors, stakeholders and the public.

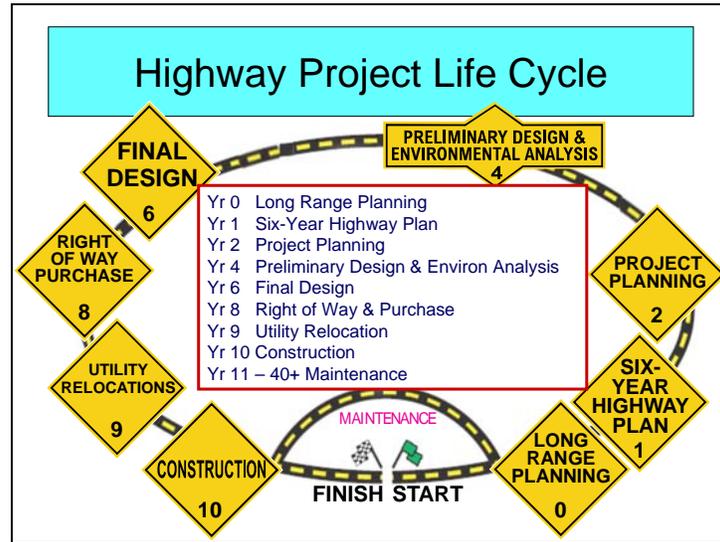
Slide 1



This workshop was prepared by the Kentucky Transportation Center Context-Sensitive Solutions Team including: Don Hartman, Jerry Pigman and Ted Hopwood. It is intended to provide transportation agency personnel involved in Maintenance with information about Context-Sensitive Solutions (CSS) and actions they should take to incorporate it into their routine activities to supplement and support it. Those collective actions comprise Context-Sensitive Maintenance (CSM)

The background shows pavement scarifying on a Kentucky Transportation Cabinet project (2006)

Slide 2



This is a diagram used to explain program management to the public, but it also shows the life cycle of a highway construction project.

Typically 6-8 years is spent in project development where the project commitments (PCs) are created.

2-4 years is spent implementing these PCs from ROW through construction.

30-40 years or more of Maintenance & Operations are required on the completed facility where some PCs must be maintained.

The facility becomes inadequate and must be reconstructed.

The cycle starts again, beginning in year 0 (long range planning)

Context Sensitive Maintenance (CSM) is necessary for 80 percent of the 50 year project/facility life cycle!

The Wide Scope of CSM Activities

- Maintenance input in CSS PD Process
- Maintenance obligations from CSS projects
- Project development by Maintenance
- Routine maintenance (in-house & contract)
- Maintenance facilities activities

Maintenance is involved in a wide range of activities where CSM can be applied. These include perpetuation of transportation agency CSS promises/ requirements (we call project commitments or PCs) that were made when a facility was constructed/reconstructed during the traditional CSS PD process). Some projects are developed in-house by Maintenance and handed off to Construction in the contract letting process. Routine maintenance of facilities is another Maintenance action. Finally, there are activities at transportation facilities such as Maintenance garages/barns that address CSS and sustainability principles. All of those actions help reinforce stakeholder/public perception of an agency's commitment to community and environmental harmony. Taken jointly, these actions are aligned to promote a wide range of transportation agency actions including development of new projects.

Why Apply CSM Outside of CSS-Developed Facilities?

- CSS principles should be applied to projects developed by Maintenance
- Routine maintenance activities can address context sensitive issues?
- Context sensitivity is more than environmental compliance
 - Just as CSS is more than NEPA compliance

CSM can be applied to most Maintenance (and Operations) activities including those at transportation agency Maintenance facilities. The prevailing view of CSS is that it is project (and possibly facility)-related. In many instances, the range of transportation agency maintenance activities are intended to be “environmentally compliant”. That relates to regulations impacting the public and natural environment. Just as the application of CSS to project development exceeds the NEPA review boundaries of environmental compliance, CSM extends those boundaries as well. CSS addresses disruption to communities and the natural environment. CSM completely addresses disruption to motorists, communities and, in addition, environmental compliance. When CSM is coupled to a continuous improvement program, it results in transportation agencies exceeding requirements for environmental compliance and also addresses sustainability issues.

Just as transportation agencies can no longer be simply NEPA compliant, they cannot remain just environmentally compliant. Agencies cannot just apply context sensitive principles to projects, they must apply them on all major activities related to facility management. This expanded focus will promote stakeholder/public confidence in transportation agencies and enhance their efforts to engage stakeholders/public on all activities not just project development.



Common Project/Work Goals

- Project/task completion
 - On time
 - On budget
 - Safely
 - In accordance with plans, procedures, special notes, specs., etc. &
 - No change orders on contract work

This is identical to project/work goals discussed in the previous module. These are the goals for any construction project. They remain the goals for any project/contract developed by Maintenance and they are the goals for any in-house maintenance work along roadways.



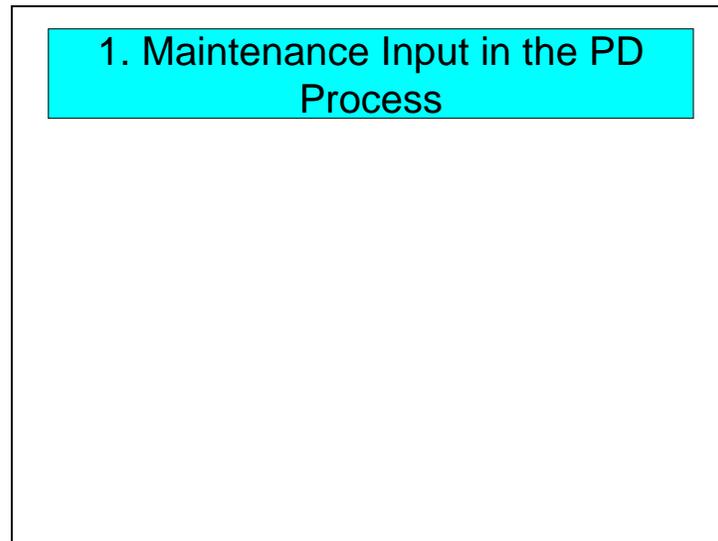
The additional CSM goals include preservation of communities and the natural environment. Preservation activities include the goal of minimizing disruption to communities and the environment during maintenance activities. Another key goal is to honor all DOT commitments to stakeholders/public.

The background shows routine ditch maintenance being performed in Polk Co, FL.

Primary Components of CSM

1. Maintenance input in the PD process
2. Project hand-offs to Maintenance
3. Maintenance project development
4. Maintenance by state forces
5. New opportunities for applying CSM
6. Steps for improving CSM practices

These are six primary components to CSM. They are also the major topics covered in this workshop module.



1. Maintenance Input in the PD Process

Maintenance appears to be removed from the full CSS PD process. However, Maintenance input to the PD process can be useful, when it relates to PCs that might be made by Planning, Design or even Construction. It is easy to make promises that your unit/division doesn't have to fulfill. Other units/divisions may make PCs to move a project forward. However, complying with those over the long-term is not their concern. Once a project is completed, the budget for that project has been expended. From then on, any agency actions to perpetuate PCs will probably come from Maintenance funds.

Maintenance Input in the PD Process

- DOT policy for maintenance input
 - Can be active or passive
- Active input involves a maintenance representative on the Project Team
 - Can advise on maintenance friendly PCs
- Passive input is triggered by rules
 - Will a PC impact Maintenance (\$?)
 - Will the Maintenance budget be increased to accommodate it?
 - Can long-term maintenance be transferred to another party/stakeholder?

Transportation agencies need to obtain the Maintenance perspective to PC decision making that results in long-term obligations. This can be done several ways: 1) a Maintenance representative can be placed on the Project Team to review potential PCs and provide input in their impact on Maintenance (along with ways to address the PC that limit Maintenance commitments). 2) A second way is to provide for Maintenance review of potential PCs that could pose significant long-term maintenance needs. If a potential impact to Maintenance is excessive, those PCs need to be reconsidered before they are formally adopted by the agency. Maintenance commitments for a PC feature/element may be formally delegated to a stakeholder that wants it sufficiently to assume that obligation.

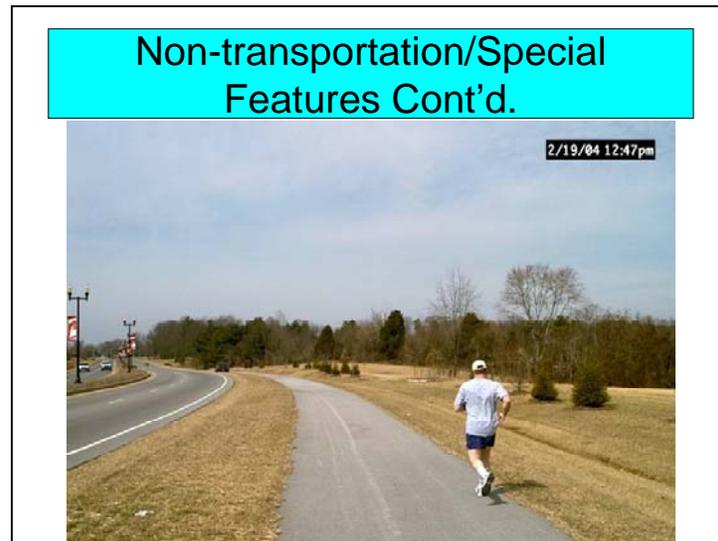
On some forthcoming projects, existing maintenance problems can be addressed and future maintenance activities may benefit from features incorporated on those projects. Those features may be used to promote an environmentally difficult project with resource agencies by showing the improved environmental outcomes that result from the project. Maintenance input early in the PD process can enable transportation agencies to improve their operations by adding maintenance-friendly features.



This is a Kentucky Transportation Cabinet rendering showing the future appearance of significant tree and shrubbery plantings along a reconstructed road. The Cabinet spent \$1 million in plantings and \$7 million to complete the project. This rendering constitutes an implied commitment by the Cabinet. The project was completed in 2003.

A prominent stakeholder on the project stated that she would withhold judgment on the Cabinet's PC follow-through until the trees were mature (which will probably take 10-15 years). This rendering was provided to the stakeholders/ public early in the PD process. What will happen if the plantings die or otherwise fail to live up to rendering?

This is KY 234 - Cemetery Road in Bowling Green, KY (2003).



This is a view along the same project. Significant green space was purchased along the ROW. It was left undisturbed to provide the open setting. Some of the plantings are observable along the multipurpose trail. Which maintenance responsibilities could be ceded to others (in MOUs) and which would probably remain with the Cabinet? Should Maintenance be involved in the PC decision making for this delegation of responsibilities? Note the items to be considered are: 1) the maintenance of the trees and shrubs, 2) mowing the grass, 3) maintenance of the trail and 4) function of the ditch.

Note that the Cabinet signed a MOU with local governments who assumed responsibility for the mowing.



This is a signature bridge on I 65 near Collinsville, IN shown when new. The second view is of the bridge some years after it was completed. Note that the paint remains in serviceable condition. For most bridges it would not need to be considered for repainting at the time the second picture was taken. However, due to its aesthetic appearance and prominence, the bridge probably should receive a new top coat of paint.

Special coatings such as fluoropolymers and polysiloxanes provide weathering resistance and colorfastness for long-term aesthetics. However, they are more expensive than conventional top coats such as polyurethanes and acrylics.



This Colorado DOT project is a good example where Maintenance input helped shape a CSS project to provide many benefits including several accruing to Maintenance.

Maintenance/Operations Issues with the Existing Facility

- Snow storage
- Eroded and unstable slopes
- Surface icing
- Water quality problems
 - Sand runoff
- Wildlife/vehicle collisions

Some of the problems were related to the location of the facility. In the winter, the road accumulated large amounts of snowfall. Due to the duration of cold temperatures, a significant amount of snow fell and built up. Sand was required to keep motorists on the roadway. There was no place for Maintenance to put the snow except to push it to the edge of the road. A snow-sand mixture accumulated and in the spring thaw the mixture washed down the mountainsides clogging drainage systems and polluting lower lying streams and wetlands. The washing action also eroded slopes and contributed to slope stability problems.



The road template was revised to better accommodate temporary storage of snow at the side of the road.



Specially designed sediment basins were installed to trap the sand. The road template and drainage systems routed the melted snow and sand into these basins. The basins were designed to allow front end loaders to readily extract the sand (re-used for snow or other applications). This effectively dealt with the slope erosion, water quality and wetland issues and allowed for some sand recycling.

Slide 17



Trees were planted along the slopes to stabilize them and prevent erosion.

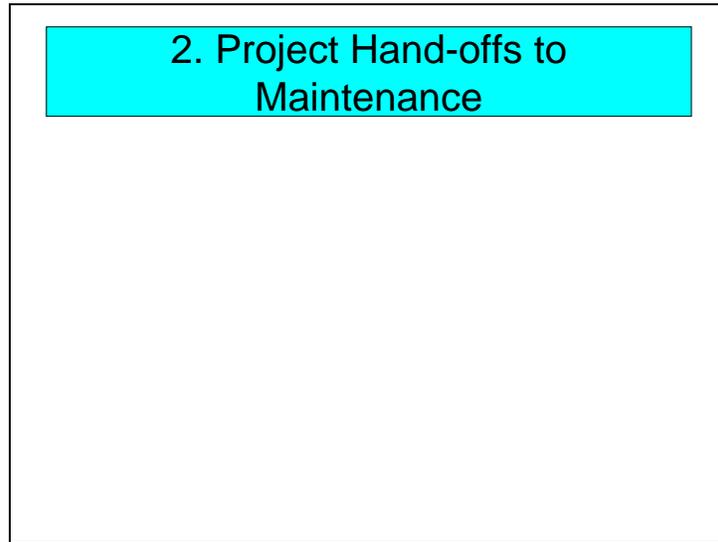


Special cut slopes were triple terraced and retaining walls were constructed to further address erosion and slope stability.

Slide 19



Deer fences were added to prevent animal/vehicle collisions.



2. Project Hand-offs to Maintenance

When a CSS project is accepted as a new facility, Construction needs to provide specific information to Maintenance related to CSS features/elements and PCs that require special consideration after the facility is placed in service. This hand-off is vital to maintaining stakeholder/public trust and facilitating future agency efforts to develop future projects.

Hand-offs to Maintenance

- Important on CSS projects
- Maintenance information needs
 - On-going PCs
 - CSS special features
 - Unresolved/problem issues
- Information transfer
 - After/near project completion
 - Maintenance participation at post-construction meetings

Details concerning Construction hand offs to Maintenance on CSS projects were discussed in the previous module. To briefly review/expand on this, Construction should provide Maintenance with a list of PCs including on-going agency requirements. Other information can include existing warranties, results of CSC audits and any unresolved issues with stakeholders/public that may be of concern. This information can be kept in the project file or in a separate one containing details of CSS features present on a facility.

If Construction/Maintenance hand-offs are not occurring at a transportation agency, Maintenance should seek policy/procedure changes to require those on all CSS projects.



Final inspections should include CSS items. A portion of the stone façade on this retaining wall has become disbonded. It should be repaired before the project is completed.



Where warranties are provided for plantings, the condition of the plants should be determined including whether they were properly planted (including whether a living plant was healthy and whether it was properly planted/fertilized/ watered/mulched). Theft of fresh plantings can be an issue and provisions for addressing any plant loss prior to project completion should be included in the contract terms (if plant loss occurs before a project is accepted for final payment).

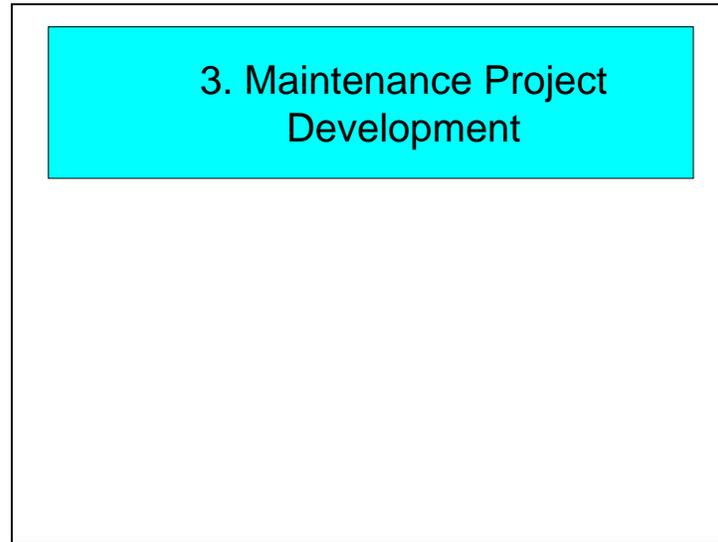
Maintenance should not have to assume facilities with incomplete work, especially on CSS items. Contractors should be required to have all work related to PCs completed and in good condition prior to project acceptance.

Value of a CSS Feature File

CSM Item 10. Steel-backed wooden guardrails are present on US 60 in Lincoln County from station __ to station ____ with a total of 30 end-treatments (6,000 linear ft.) the guardrail was purchased from _____. This item is to be fabricated and installed according to DOT Standard Detail Drawing, _____. Any guardrail along this section of road with the wood facing missing or with other obvious signs of crash damage must be replaced with the equivalent type. Inspect every 30 days. Replace damaged sections according to DOT standard policy for guardrail replacement-with the exception of using this special design."

Once a project is completed, Maintenance officials should prepare a list of special CSS features/project commitments that were constructed/planted along the project along with an inspection/maintenance schedule that includes any special guidance/information (e.g. special inspection requirements).

In the 2006 Kentucky Transportation Center survey of transportation agency CSS practices, about half the responding transportation agencies employed special/more attentive maintenance on projects developed using CSS.



3. Maintenance Project Development

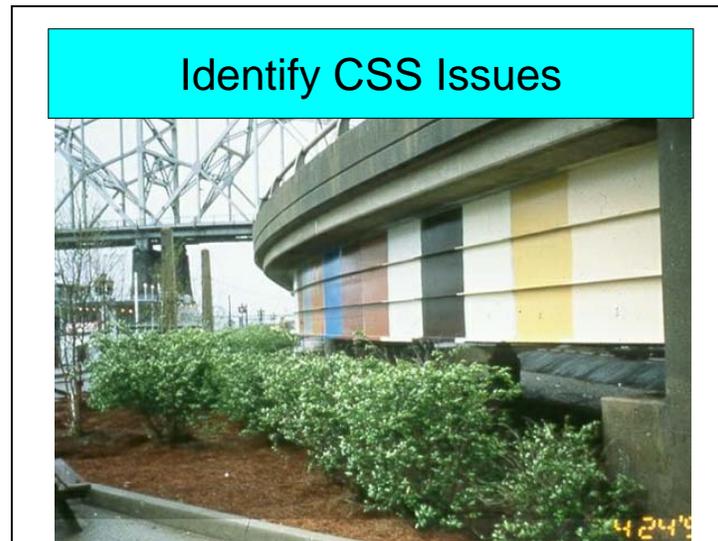
When Maintenance is to have major work performed by contract, it usually develops the project. As previously noted, those projects are usually considered falling within the ROW and do not involve major redesign or reconstruction of highway facilities. However, some Maintenance projects such as those in urban areas can be very complex in their interactions with the community or the environment. Whether or not a project is developed using a full CSS PD process involving other units or developed solely by Maintenance may depend on circumstances such as available funding.

Development of Maintenance Contracts

- Determine need for a project
- Meet with District officials
- Identify/contact stakeholders
- Determine project requirements
- Establish scope of work
- Hold pre-bid meetings
- Prepare PS & E documents

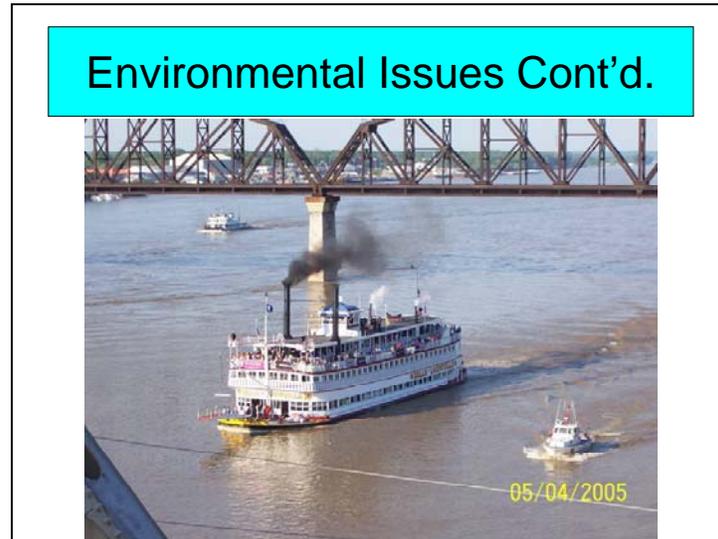
The Maintenance PD process for significant contract work should begin with meetings with Construction, Maintenance and Environmental and relevant District officials to discuss the proposed project. Follow-on work includes: 1) visiting the site to identify community and natural environment issues that should be addressed in performing the work, 2) having additional contacts with District officials to discuss issues such as traffic control requirements & key stakeholders, 3) informing/consulting with key stakeholders (including resource agencies) about the proposed project 4) establishing community/environment needs and 5) agreeing with stakeholders about any project PCs.

Once project requirements are established (facility work and PCs) the scope of work can be fully prepared including preparation of draft special notes and assembling of plans & specifications. A pre-bid meeting may be useful. Thereafter, the PS&E documents can be finalized and the project advertised for bid. In most cases, project oversight will be performed by Construction. Maintenance officials should participate on the Project Construction Team to assist Construction and have a role in any decisions made that impact the scope of work, budget or PCs.



Maintenance should solicit stakeholder/public input during project development. This is a means of establishing good working relationships with local governments, interest groups and resource agencies and working to enhance the image of the agency with the general public.

The picture shows color test patches placed on the I 64 Riverside Parkway in Louisville, KY (1995). Several stakeholder groups sponsoring a new riverfront park in the city wanted to have input on the color selection for repainting the 3.2 miles of elevated steel structures on the Parkway. The Kentucky Transportation Cabinet accommodated their wishes and a color was selected by those groups.



There are special events in many urban areas that may require cessation of work. Pictured is a steam boat race during Derby Week in Louisville. The height of the riverboat smokestacks reduces normal bridge/river clearances and prevents maintenance activities under bridges (e.g. structure containment for bridge painting). Due to the large-scale festivities occurring during that period, maintenance activities in Louisville are usually temporarily suspended for the week.

Pre-Bid Meetings

- Purpose of meeting
 - Inform prospective bidders about project requirements
 - Identify beneficial revisions to contract documents
 - Get all participants on the “same page”
- Conducted before preparation of final contract documents (e.g. special notes, plans, traffic control plans, etc.)

Maintenance projects are usually developed in a compressed time frame compared to the full PD process. Planning and design usually are not involved and consultation with stakeholders may be limited. Under those circumstances, it is vital to ensure that all parties are on the same page.

If a project has significant PCs (even if only for addressing environmental issues), a pre-bid meeting should be held. Key stakeholders may wish to provide input about issues of concern. In these meetings, all parties can have input and changes can be made to the final bid documents to accommodate any unforeseen project requirements.

Slide 30



This is a typical Kentucky Transportation Cabinet Maintenance pre-bid meeting on a painting project. The Maintenance project manager is addressing the group. Agency representatives from the Environment and Construction divisions are in attendance to answer questions from stakeholders and bidders.

Typically, these meetings are videotaped and transcribed. Prospective bidder questions and agency responses are placed on a Cabinet web site shortly after the pre-bid meeting. Bidders are required to attend these meetings.

Slide 31



In addition to holding an office pre-bid meeting for painting contracts, agency Maintenance personnel hold project site meetings. This ensures that the prospective bidders have seen a project prior to submitting their bids. They may pose additional questions to agency personnel based upon seeing the project site and its environs. These field inspections are also mandatory for potential bidders.

Role of Maintenance on Large CSM Projects

- Participate on Construction Project Team
- Participate in pre-construction meetings
- Participate in partnering
 - Formal or informal

In many instances, large Maintenance projects are as complex and broad in scope and as long in duration as those developed using the full PD process. Maintenance officials that develop projects should have continued involvement with them to ensure that CSM principles are properly applied.

Maintenance officials should participate with district Construction officials on the Construction Project Team. They should participate in pre-construction meetings and periodic partnering meetings with the contractor once the work has begun.

Role of Maintenance on Large CSM Projects Cont'd.

- Monitor contractor's work
 - Quality of work that is performed
 - Compliance with PCs
 - Activities to minimize disruption
- Observe any safety issues
 - Report issues with Construction

In addition to working on the Construction Project Team and participating in partnering meetings, Maintenance personnel involved with developing a project should occasionally visit the job site and inspect the contractor's work. Beyond concern about the quality of the work being performed are the CSM issues including compliance with any project PCs and the contractor's actions to minimize disruption. Additionally, any safety issues should be brought to the attention of Construction field personnel. As previously noted, accidents can result in stakeholder/public concern about the transportation agencies follow-through with PCs and raise doubts about agency actions related to project safety.

Minimal Disruption

- Minimizing temporary disruption during maintenance work
 - Affected parties
 - Motorists
 - Residents
 - Businesses
 - Communities
 - Environment
 - Some issues may not have been addressed prior to the onset of work

Since most Maintenance work occurs along the ROW, there are many possibilities for disruptions, especially those impacting motorists and communities. Environmental disruptions may also be an issue and should be addressed in the bid documents. Some disruption issues may be discovered when work begins. The guiding rule in dealing with those is to minimize their occurrence and impact.

If the work is on a major Maintenance project, the contractor's plans for traffic control (or erosion control, etc.) need to be discussed during the pre-construction meeting and approved by the agency before work is begun.

Minimal disruption by Maintenance applies to both projects and routine work that may be done in-house or by special contracts.



Public input on disruptions can be enlightening. A survey of the public in Louisville related to traffic control measures for several large-scale Maintenance projects on I 65 revealed that the public preferred weekend road closures over extended lane closures throughout the week.

This is a recent paving project on I 65 in Louisville performed by the Kentucky Transportation Cabinet (2006). The project utilized full closure of the interstate lanes in one direction during the paving work. The work was done on weekends and traffic normally using I 65 was diverted to adjacent city streets.

Regulatory Compliance Issues

- Maintenance officials need to monitor projects
 - Work with Construction officials
- Address special issues that arise on projects

On projects developed by Maintenance officials, they may be more aware of environmental regulations and other issues than Construction personnel overseeing the work. In many cases Maintenance officials will have established relationships with resource agencies that allow them to resolve issues before they result in major problems and NOVs. As part of the Construction Project Team, they should occasionally visit job sites to observe how the work is progressing and assist Construction personnel in identifying situations that could become problems. They may be “on call” when specific problems arise that need their special knowledge for proper resolution.



Occasionally endangered species or plants are unexpectedly encountered on maintenance projects. When this happens, the work must stop and environment specialists consulted to identify actions that need to be taken. Here are several bats on a bridge that is being painted. They may be Indiana bats, an endangered species. In that case, they must be treated with extreme care. The bats may, however, be a common species in which case they can simply be driven from the bridge if they interfere with work.



Project activities must conform to environmental regulations. Here is an improper temporary storage site for hazardous waste placed next to a guardrail. The waste drums are also not placed on pallets as specified by the transportation agency. This improper action by a contractor can result in a NOV, fines and bad publicity. Such occurrences must be promptly rectified.

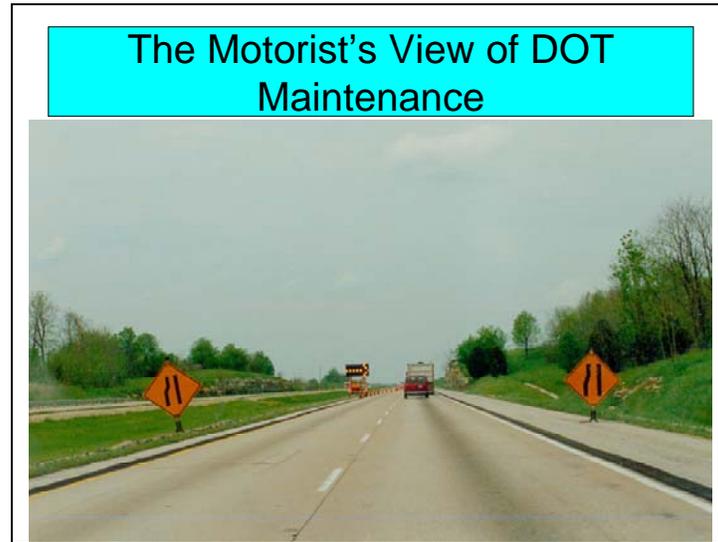


The contractor's signs should be observed to see if they are properly placed or functioning (including variable message boards). In this case, the arrow board is pointing in the wrong direction. Signage is a safety issue, poor traffic management can lead to accidents or motorist disruptions. Good CSM oversight can help avoid either of those outcomes.

4. Maintenance by State Forces

Much work performed by transportation agencies is to maintain the levels of service provided by their facilities. There is a trend by some states to outsource many of those activities. Whether done by minor contracts or in-house personnel, all maintenance work should be subject to the same considerations as major projects related to implementing CSM.

Maintenance work is probably the most common activity that a transportation agency performs and it is conducted on almost a daily basis throughout the jurisdiction. It probably represents the best opportunity for transportation agencies to demonstrate their concern for motorists, communities and the environment. By practicing CSM, they can work proactively to garner stakeholder/public support for all of their actions including CSS projects (even before those projects are developed).



Unfortunately, when the public, especially motorists, see a transportation agency performing road maintenance, they see disruption to their normal activities. They don't think about the necessity of the work to maintain/enhance their safety or to preserve the roadway facilities (they pay for) in a cost-effective manner. Transportation agencies need to focus on minimizing those disruptions. They also need to go to greater lengths to inform the public of their efforts in that regard.

Maintenance by State Forces

- Routine work on facilities
- Typically performed on the ROW
- Includes
 - Roads
 - Roadsides
 - Streams
 - Bridges
 - Appurtenances (signs, guardrails, etc.)

Transportation agencies are constantly performing work on roadways to keep them in good condition. While this work is not as invasive as major contracts, it can have a cumulative impact that exceeds those for normal construction projects due to the volume of maintenance work being performed. This constant exposure to the motoring public, communities and the environment is a great opportunity for an agency to show concern and good stewardship. Those actions should conform to good CSM practice.



Each maintenance activity provides an opportunity to apply CSM. The practice of CSM also should entail improvement and better transportation agency stewardship. If properly implemented, it should provide benefits for all parties involved with or impacted by transportation facilities.



5. New opportunities for applying
CSM

CSM gives transportation agencies many new opportunities for demonstrating context sensitivity and support for sustainability. New or existing programs can be incorporated under the CSM framework to establish broad initiatives aimed at engaging stakeholders/public and obtaining new support for agency activities. This holistic approach to context sensitivity and sustainability represents a major step forward and a broader approach than relying solely on project-focused CSS to engage stakeholders/public.

New Opportunities for Applying CSM

- Work to improve maintenance practices
 - Reduce disruptions
 - Improve environmental practices
 - Enhance maintenance facility activities
- Work with stakeholders/public
 - Becoming more environmentally friendly
 - Providing roadside beautification
 - Accommodating wildlife

There are many ways to improve Maintenance & Operations practices related to CSM. Here are some of the ways that can be achieved.



Polymer bridge deck overlays combine the advantages of minimizing disruption and lowering transportation agency costs (compared to other options). The polymer material is spread, aggregate is applied (two applications) and after curing the road is reopened.

This is a good substitute for concrete overlays or membranes and can be applied with state forces. The bridge is overlaid and open to traffic within 1-2 days of the start of work.

Polymer overlays can be applied quicker than concrete overlays and may provide better service than membranes for many applications.



Night time work can minimize disruptions to motorists and the public. The use of an improved hot pavement patching material provides further improvement in disruption by decreasing the frequency of future repairs. The patching material sets quickly allowing traffic over the road shortly after it is placed.



One approach to minimize disruption is to conduct several maintenance actions concurrently. This is the US 25 bridge over the Kentucky River. The bridge was repainted in 2005. Concurrent with that work, pier deterioration was repaired and a stone façade was added to the piers and abutments. Downstream from the bridge was a drinking water inlet.

The Kentucky Transportation Cabinet worked with the water company to protect a drinking water inlet from ingress of lead paint residue and other paint spills by paying the company to install a temporary charcoal filter on the inlet while the work was being conducted. By conducting concurrent work, only one filter application was necessary.

By conducting several maintenance activities concurrently, the Cabinet also saved on contractor mobilization costs and limited disruptions to motorists who routinely used the bridge.



This is a sidewalk reconstruction project conducted by the District of Columbia DOT in Georgetown. Not only were the sidewalks deteriorated, but there were many utility problems. The DOT partnered several utilities to conduct concurrent repair work. They shared costs for common expenses including traffic control. By working together they minimized the community disruption that would otherwise have been extended by doing the work sequentially. Also, they minimized the possibility of damage to the sidewalk by subsequent utility maintenance work. All work was performed at night to limit community disruption and special actions were taken by all parties to limit noise and light nuisances during the project.

Working with Resource Agencies

- Seek to involve them with Maintenance activities
 - Obtain programmatic agreements
 - Employ best practices
- Become “greener”
 - Eliminate or use less harmful chemicals
 - Reuse or recycle to eliminate waste generation
 - Conduct environmental awareness training
 - Make sure that DOT facilities are environmentally compliant
- Assist resource agencies/stakeholder groups when opportunities arise

To implement CSM a transportation agency has to focus on improving its environmental practices. Resource agencies should be solicited for input on agency maintenance activities. Working with a transportation agency’s Environmental Division, Maintenance can forge MOUs with state resource agencies that may eliminate some site-specific permitting requirements. This requires both sides to agree upon “best environmental management practices” and the agency implementing those explicitly.

The agency can become more environmentally friendly by following the tenets of sustainability. This means using less chemicals (or less harmful chemicals) and seeking alternative practices to avoid/minimize their use. It also means reusing or recycling old materials wherever possible. Another initiative relates to conducting environmental awareness training for agency Maintenance personnel. Resource agencies also have objectives they wish to achieve. When opportunities arise, transportation agencies should work with them to achieve “win-win” solutions.



The Kentucky Transportation Cabinet is recycling lead paint residue from maintenance painting operations. The residue is shipped to a recycling plant in Missouri. Then it is melted in a furnace producing lead ingots. The approach is cost effective and avoids many resource agency regulations. It also minimizes *in perpetuity* liability concerns that exist with conventional hazardous waste disposal.

This practice is environmentally compliant and promotes sustainability goals.



Scrap tires provide a significant opportunity for transportation agencies to have beneficial environmental roles. In many locations, huge dumps have been created to accommodate the masses of scrap tires that are generated in the U.S. These constitute fire, vermin and disease hazards. The Indiana DOT has enacted a program to collect scrap tires at their maintenance facilities and send them to a recycler. Over 20,000 tires have been collected/recycled under that program.

There have been numerous trial applications of scrap tire material for pavement, subgrade and slope stability applications. The Texas DOT has also used recycled tire material as anti-vegetation tiles around signs and guardrail posts. This provides long-term protection, minimizing maintenance activities and eliminating/limiting the use of herbicides.

These efforts address an important environmental/societal issue and also promote sustainability goals.



Dead animals along roadways is a constant concern for transportation agencies. In the past, they were commonly buried (with significant restrictions on the burial process). Now agencies are investigating new procedures including carcass composting. The carcasses are taken to an agency facility, placed in a bed of wood chips and allowed to decompose. Later, the compost can be ground and used for roadside fill.

This avoids problematic health issues related to carcass burial and provides a recycling opportunity for the carcasses and wood clearing wastes generated by the transportation agency/contractors during highway work.



Here is a slide on “best management practices” for working in streams. It is from a Kentucky Transportation Cabinet environmental awareness course taught by Division of Environmental Analysis and Division of Maintenance staff to Maintenance personnel.



Transportation agencies can assist resource agencies and stakeholder groups when Maintenance-related opportunities arise. One opportunity involves protection of endangered species.

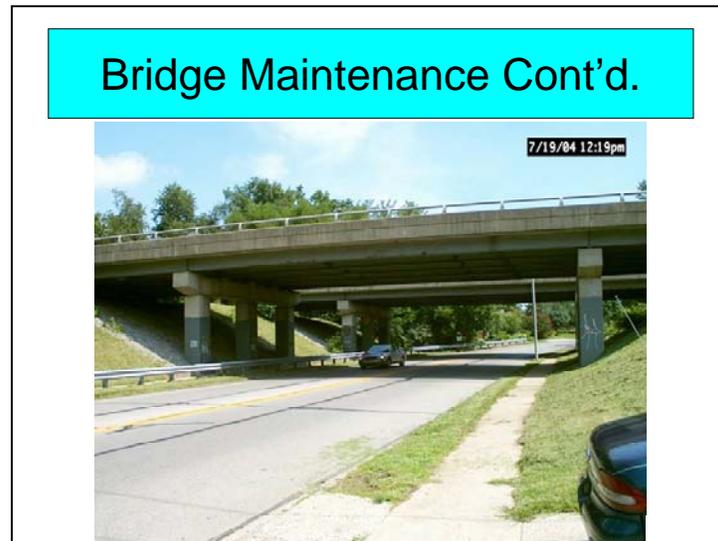
The peregrine falcon is an endangered species whose well being is of concern to many resource agencies and stakeholder groups (e.g. bird watching societies). The peregrine falcon nests at heights and roosts on tall buildings and bridges. Here the New York State DOT has cooperated with the New York EPA to place a peregrine falcon roost and camera on a bridge pier. The New York EPA will use the facility to monitor this site as, hopefully, a successful habitat for the falcons.



The North Carolina DOT has a program to promote monarch butterflies. Here the DOT is planting milkweed along the ROW to provide butterfly habitat.



Many transportation agencies have wildflower planting programs along ROWs. North Carolina DOT personnel are shown planting wildflowers which provide significant enhancement to roadsides when they bloom. The next picture is of a wildflower bed planted by the Kentucky Transportation Cabinet. Less spectacular, but of more local significance is this Iowa DOT planting of native species. These practices can be used as part of programs to control invasive species.



Local governments are struggling to deal with graffiti. It is known to promote crime and degrade areas where it is present. Transportation agencies can assist local governments with “zero tolerance” graffiti programs by painting agency structures/appurtenances that attract graffiti with coatings that are graffiti resistant. Oftentimes, these coatings can be used to protect the structures from deterioration due to corrosion or ingress of deicing salts.



Like charity, good environmental practices begin at home. Transportation agency maintenance facilities need to be environmentally compliant and use best practices to provide environmental compliance and promote sustainability.



6. Steps for Improving CSM Practices

In addition to seeking new opportunities for applying CSM practices, transportation agencies should constantly work to improve their activities related to CSM.

Steps for Improving CSM Practices

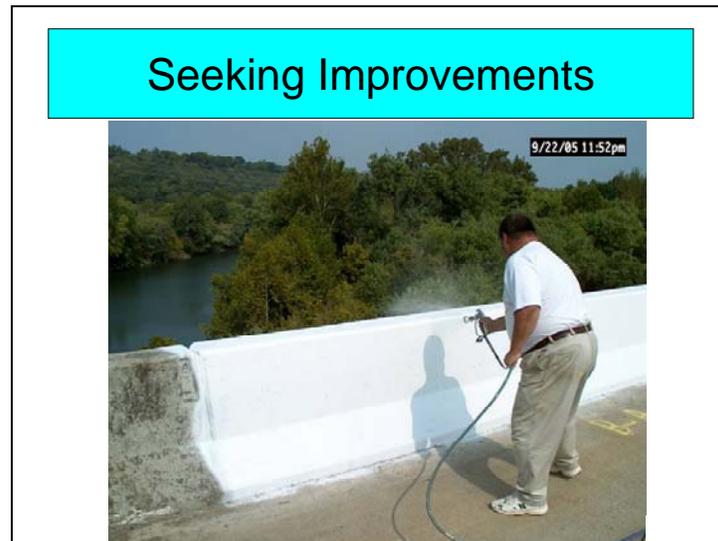
- Study the effectiveness of current CSM activities
- Seek improved materials & methods
- Implement improvements statewide
- Partner with other DOTs to identify improvements

As shown in the last section, there are many opportunities for transportation agencies to apply CSM. However, the best way is as part of a coherent community and environmental stewardship program. The program can involve demonstration projects, research, continuous improvement initiatives and partnering with other agencies to share information or conduct coordinated research.

Study the Effectiveness of Current CSM Activities

- Conduct final inspections of CSM work
 - Done by contractors & state forces
 - Inspect CSS/CSM features
- Obtain input from stakeholders & the public
- Identify what works & what needs fixing
 - Compile lessons learned
 - Seek to identify potential areas of improvement

Final inspections of maintenance projects (or even in-house activities) should include CSS items. Where warranties are provided for plantings, the condition of the plants should be determined including whether they were properly planted. Post-construction punch lists should include any CSS items that need to be completed/repaired. That work should be affected prior to final contractor payment. The work should be completed in a timely manner.



Transportation agencies should sponsor/conduct research seeking maintenance improvements. The Kentucky Transportation Center (a university based research unit) is assisting the Kentucky Transportation Cabinet by investigating new coatings for concrete. These are more durable, more aesthetic, provide better concrete protection and better resist graffiti than conventional coatings.



Transportation agencies need to work together to identify and explore better CSM practices. This is a meeting of the Midwest Bridge Working Group, a regional cooperative of 12 state transportation agencies that meet twice yearly to exchange information concerning best practices for bridge maintenance and inspection. This type of format has proven an effective means of sharing information.

Regional working groups can be established to promote a community of practice addressing CSM.

Last-But Not Least

*When the DOT does good things-don't
keep **them** a secret!!*

On conventional CSS projects, the public and stakeholders see the benefits of transportation agency efforts to make projects fit better with communities and the natural environment. CSM activities may escape notice as they usually have impacts of less magnitude. If an agency is making these types of efforts, it should publicize them as much as possible. Transportation agencies are benefiting from improved stakeholder/public relations as a consequence of using CSS. If those parties are made aware of CSM activities, further benefits will accrue.

For more information or a complete publication list, contact us at:

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